RAILROAD GAZETTE

FRIDAY, MARCH 25.

NEWS OF THE WEEK.

We give below, in a condensed form, the leading news items of the week. These items will be found in detail in their appropriate columns.

Meetings Next Week.—Union Pacific, in Boston, March 30.

Elections.—Bangor & Piscataquis, E. B. Nealy, President.—Brashears Parlor & Sleeping Car Co., T. O. Singleton, President.—Chattanooga Land, Coal, Iron & Railway Co., J. W. Adams, President.—Chatham & Harwich, Marcellus Eldridge, President.—Cleveland, Akron & Columbus, N. Monsarrat, President.—Fitchburg, Daniel Gleason, Treasurer.—Griffin, La Grange & Birmingham, Douglas Green, President—Hastings, St. Paul & Cannon Falls, R. C. Libbey, President.—Inter-state Commerce Commission, T. M. Cooley, W. R. Morrison, A. Schoonmaker, A. F. Walker, W. L. Bragg.—Missouri, Tenessee & Georgia, L. B. Wright, President.—New York Railroad Commission, Michael S. Rickard, Commissioner.—St. Johnsburg & Lake Champlain, W. A. Stowell, Secretary and Treasurer.—St, Louis, Vandalia & Terre Haute, C. D. Hoiles, Secretary.—Housatonic, W. H. Stevenson, Vice-President.

Personal.—D. L. Gallup resigns as Auditor of Atlantic & Pacific.—C. C. Prescott resigns the position of General Manager of the Oregon Railway & Navigation Co.—Died: Edward C. Reddington.—Horace Wilbur.

Traffic.—Anthracite coal shipments for week ending March 19 show increase of 14.1 per cent. as compared with corresponding period last year; bituminous shows increase of 73.0 per cent.; coke, for week ending March 12, shows increase of 49.9 per cent.—Cotton receipts, interior markets, for week ending March 18, show increase of 22.9 per cent. as compared with corresponding period last year; shipments show increase of 23.5 per cent; seaboard receipts show very slight decrease; exports an increase of 121.5 per cent.; cotton in sight is less than at same date last year by 34.1 per cent.

Earnings.—For the month ending Feb. 28, gross earnings of 5 roads are reported, all showing increase. For January, gross earnings of 7 roads are reported, all showing increase.

Changes and Extensions.—*Alabama:* Atlanta & Alabama will begin survey.—*Arkansas:* Fort Smith & Southern will be built from Fort Smith, southward.—*California:* San Bernardino & Los Angeles lays track for 17 miles.—*Georgia:* Atlantic & Alabama to be surveyed at once. Georgia Midland & Gulf is completed for 43 miles.—*Illinois:* Chicago & Eastern Illinois now building from Sidell to Tuscola.—*Indiana:* Midland lays track west from Lebanon.—*Missouri:* Missouri Pacific will build 10 mile branch. Missouri Central will begin work next month.—*Montana:* Union Pacific will build from Anaconda to Phillipsburg.—*New York:* Hartford & Connecticut Western being surveyed from Rhinecliff to Poughkeepsie Bridge.—*Pennsylvania:* Philadelphia, Newtown & New York will be extended to connect with Central of New Jersey. Pittsburgh & Western will be connected with the Pittsburgh, Painesville & Fairport, at Fairport, O. Philadelphia, Newtown & West Chester to be built to West Chester. Baltimore & Ohio will make through connection to Fairport, O.—*Tennessee:* Lookout Mountain narrow-gauge road is completed.—*Texas:* Gulf, Colorado & Santa Fe will extend line from Paris, Tex., to St. Louis, Mo.—*Washington Territory:* Northern Pacific will extend Spokane & Palouse road 60 miles.—*Wisconsin:* Wisconsin Midland is surveying 15 mile line.

New Companies Organized.—Arlington incorporated in New York.—Brashear's Parlor & Sleeping Car Co. incorporated in Baltimore, Md.—Chattanooga Coal, Iron & Railway Co. organized in Tennessee.—Chicago, Danville & St. Louis incorporated in Illinois.—Cumberland Plateau, Obed River & Nashville incorporated in Tennessee.—Elgin, Joliet & Eastern files incorporation articles in Illinois.—Griffin, La Grange & Birmingham organized in Georgia.—Missouri, Tennessee & Georgia incorporated in Tennessee.—Mount Pleasant & Big Rapids incorporated in Michigan.—Nittany Valley incorporated in Pennsylvania.—Omaha & Council Bluffs Railroad & Bridge Co. files incorporation articles in Omaha, Neb.—Virginia, Parkersburg & Ohio River incorporated in West Virginia.

Leases and Sales.—Lake Erie & Western purchases the Indianapolis, Peru & Chicago.—St. Joseph & St. Louis is sold.—Southern Pacific will take possession of the Oregon & California road.

Reports and Financial.—Chicago, Milwaukee & St. Paul for the year ending Dec. 31, shows an increase of 1.1 per cent. gross, and 2.5 per cent. net.

Miscellaneous.—Boston & Maine committee of directors authorize lease of the Boston & Lowell. Bill authorizing the company to purchase property of the Eastern Railroad Co. passes Maine Legislature.—Cleveland, Akron & Columbus issues new bonds to finish the Dresden Branch.—Gulf, Colorado & Santa Fe reported to have bought the Texas Trunk, the Kansas & Gulf Short Line and the Gulf & Pacific.—Northern Pacific road is badly flooded in Dakota.—Richmond & Alleghany adopts plan of reorganization.—Wabash, St. Louis & Pacific intervening petition dismissed.

Contributions.

A Question for the General Passenger Agents.

BUFFALO, March 1, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

As it will soon be time to clear the oyster cans out of our gardens, put on spring bonnets and adopt a summer schedule, the present would seem to be a good time to project a much-needed reform in railroad operation, which has long been awaiting its opportunity, to wit, the proper publication of time tables. In England changes of time always take place on the first day of the month, and, I believe, ignorance is the only thing that keeps us from adopting the same excellent plan. The present usage here is the cause of untold annoyance. Railroads change their plans at their own sweet wills, and at a moment's notice. They make a pretense of publishing their time tables in the newspapers, but the notices in many papers appear only every other issue, and the week before a change takes place, the most critical period for a casual traveler, the old time table generally stands in its place as innocently as a fence post, giving no hint of the impending disarrangement. Notice of change, if issued, is in the form of a poster put up around the depots and a few other places, so that it does not reach the busy man at his home or office. And if he happens to belong to the sensible class, who, to save themselves from drowning, have resolved not to look at the diluted columns of the blanket sheet dailies, except under the direst necessity, he may fail of receiving the least intimation of coming changes. Although there are various ways of correcting these minor, but troublesome, evils, it seems to me that the adoption of the English plan would be the simplest and most natural, and so I write to you, your position near the Hotel Brunswick giving you peculiar advantages, to urge you to influence the coming Time Convention, which railroad men tell me has immense power, to inaugurate this needed reform. What is to hinder

G. P.

[The *Railroad Gazette* has heretofore advocated this reform and remarked upon its simplicity and ease of accomplishment. Although not so easily lived up to after its adoption as the standard time innovation was, it is still more easy to begin than that important revolution was, for any large road with real pluck can start single-handed, if necessary, and trust that others will follow. There should, however, be no necessity for this, for the General Time Convention is, as suggested, just the right body to take up such a problem, and it is to be hoped the members will consider it at their next meeting. The middle of the month—say the Sunday nearest the 15th—would perhaps be a more convenient day than the first for adoption in this country; and many roads might find it desirable to reserve the privilege of adding new trains (for seashore and mountain travel) while binding themselves not to withdraw or to change the time of any old ones between times; though it is to be noted in passing that traveling people are frequently caused annoyance and disappointment as much by the putting on of a new train without their knowing it as by the withdrawal of an old one.—EDITOR RAILROAD GAZETTE.]

Local and Through Traffic.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Mr. C. M. Higginson says: "The interstate business passing over a number of our leading lines amounts in some cases to 90 per cent. of the total business moved, thus indicating the length of haul for traffic as now handled."

Your editorial in same paper says: "We believe Mr. Higginson is mistaken in the idea that the relative financial importance of local traffic is rapidly declining." A leading Iowa newspaper of about the same date says: "The pool lines crossing Iowa have thrown everything out of balance in their own management, and in their state, in their rivalry and greed for transcontinental business."

"We are reliably told that the freight on this during all the fierce wars for it has amounted to an average of only eight hundred thousand dollars a year."

"But to get this, the pool lines, not realizing a thousand dollars a day apiece from it, and to get the tail end of through rates from manufacturing or merchandizing towns or cities in the East, have neglected their own territory and discriminated against the state and people of Iowa, paying over thirty times as much a year as they are able to get from the greatly exaggerated and much-vaunted transcontinental business."

The *facts* are important. Who has access to the most reliable statistics?

If Mr. Higginson is right, his facts are a libel upon what was once, at least, the successful policy of his own company.

A.

Derailment Brakes.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I am glad to see that this subject is now attracting some attention, as shown by the fact that no less than three different devices for this purpose were mentioned in your columns last week.

In regard to the mechanical construction of derailment brakes, permit me to say that a frangible disk or suspended pipe attached to anything except the equalizer, journal box or axle is unsatisfactory and impracticable. A series of experiments on this point were made on the Pittsburgh, Cincinnati & St. Louis some two or three years ago, and were published in your paper under the title of "Is a Safety Chain Safe?" The proper proportions and positions of the derailment brake were deduced from these experiments, which showed that when the frangible pipe was attached to an empty car body it would be too high above the rails, and conversely when the car was loaded, it would have a tendency to interfere with low joints, Wharton switches and so forth. These appliances are never more than 3½ in. above the top of the rail, and as pilots clear the track by 3¼ in. this distance may be adopted as the normal position of the derailment brake. The height of a 60-lb. rail is 4¼ in. and the construction and application of the derailment brake is such, that when it is maintained at such a fixed place and distance as above assumed, that even the raising of its valve of only ⅛ in. off its seat will suffice to operate the brake every time, whereas if attached to the car body it could not be so neatly and accurately adjusted, owing to its variable distance from the rail.

A derailment brake should not be rendered useless after once using it (as it would with a frangible disk), for suppose a train were to start on a long trip and were to jump the track in the yard just before starting, it would either have to make the run without the disk, or wait until a new one was put in, which may mean a long delay and inconvenience. As these investigations show that the valve should be easily reset after it had been raised, and it should also be made to swivel after it is raised in order to accommodate itself to the then existing circumstances without the liability of breaking.

H.

Derailment Brakes and Fire Extinguishers.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I am much suprised that any practical railroad man should propose such a derailment brake and fire extinguisher as that illustrated in your last issue. The reputation of the mechanical department of the Pittsburgh, Cincinnati & St. Louis stands so high that I believe there is a general feeling of astonishment that such a complicated piece of mechanism should emanate from that line.

A safety device, which may be unused for years, and must always be ready to act promptly when danger arrives, should be simple and have, if possible, no moving parts. The device illustrated would in all human probability be hopelessly inoperative when required, and would probably give a great deal of trouble and many false alarms. Sulphuric acid, soda and a host of pipes, tanks, valves and springs are a strange combination with which to avert a danger, which, though terrible enough, cannot often occur even once in the lifetime of a car.

Mr. Everitt's device is, at any rate, cheap and simple, and would always be ready. Whether it would ever be likely to strike against any ballast lying high near the rail, can only be ascertained by actual test. The frangible pipe, being attached to the body of the car, no hose is necessary, a very important item in the expense of repairs.

It would be interesting to know what Mr. Westinghouse's apparatus consists of, and whether he employs a frangible pipe, or a lever actuating a valve, or some other device.

O. CASTLE.

Heating Passenger Cars.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I was somewhat amused at the contradictory remarks made by one speaker at the recent meeting of the Western Railroad Club. He started out by saying "stoves must be done away with altogether, as both automatic fire extinguishers and 'safes' were alike useless." After much talk, however, on the subject, he wound up by saying "one stove at least should be in each car, so as to be prepared in case the engine is disabled, and in dining cars, the cook stoves should have some extinguishing device to put fires out in case of accident."

POLPEDENPENWITH.

Freight Car Trucks.

Kaiping Railway,
KAIPING, China, Jan. 16, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Mr. Westinghouse's letter in your issue of Nov. 19, 1886, has caused me great satisfaction, as I have recently been contending with certain American engineers against the use of the diamond truck for Chinese freight stock.

It has had its day and done well, but as your recommendation for fast freight service is carried out, it will, no doubt, give way to something much better than even the continuous frame truck used on the Boston & Albany and indorsed by Mr. Westinghouse.

I believe myself that 42-in. wheels and semi-elliptic springs will have to be used for the fast time you propose in your article, and it may interest you to know that I have recently designed some 15-ton car trucks for this line, with 38-in. springs over each journal box, the inner ends being connected to an equalizer pivoted inside of the frame midway between the wheels. In combination with the swing bolster, I have little doubt that the result will be good.

It is probable that a longer wheel base than 5 ft. will give steadier motion and less flange wear, allowing at the same time a superior distribution of load on the rail, in which matter the English four-wheel stock is far superior to any system except the flexible ones of Clark and Cleminson.

I am rather surprised that during the rail-joint controversy no attention seems to have been paid to the greater blow given to an indifferent joint by the usual small American wheel, as compared with the 42-in. wheels in use in Europe. I have remarked that a 30-in. wheel loaded with 2½ tons does damage quite equal to the larger wheel with 4 tons of load upon it, the speeds being equal and about twenty miles an hour.

Is it not possible that the superior manner of discharging

"wagons" in England is in a great measure due to the use of turn-tables, *short handy* rolling stock and the hydraulic power in use at most large yards?

It is a question how much extra siding has to be laid simply to accomodate and shunt the long stock in use in America.

CLAUDE W. KINDER.

True Economy in Bridge Building.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The necessity has been advocated in your columns from time to time for designing our bridges to carry heavier rolling loads than exist at the present time. I will now endeavor to show that to secure true economy in bridge building, besides providing for future increase in rolling loads, we must adopt a new method of dimensioning. In other words, we must distinguish between the effect of live and dead loads in a systematic manner, and not by the rule of thumb method we have been in the habit of using where we have made any distinction at all. In our bridge calculations we have been in the habit of finding the static strains due to dead and live load, and adding them together. If the strain due to live load was 3½ times the strain due to dead load we would add 15 to 20 per cent. for impact, but if the strain due to live load was only 2½ times the strain due to dead load we would add nothing at all. Even when we did add a percentage, we added it alike to the strain produced by live and the strain produced by dead loads, although it was only on account of the live load that it was necessary to make the addition. We rarely hear of iron structures subject mainly to dead loads, such as roofs, giving way. It is structures subject to live loads and impact that have given us trouble The strain due to live load bears a different ratio to the strain due to dead load for different spans, and for different members of the same span; but it is only where this ratio approximates to zero and to unity that we have been in the habit of making allowance in those spans or members.

Whilst the dead load remains practically constant after the bridge is built, the live load is not only more severe on the iron but, in this country especially, is changing from time to time, and any bridge carefully designed will have allowance for such changes. If, therefore, in designing our bridges we must provide for changes in the future, it is the changes due to live load that must be principally considered. Ten years ago the rolling load was about 2,000 lbs. per foot of single track; to-day it exceeds on many lines 3,000 lbs. per foot, and the consequence is we are rebuilding bridges that ought to be almost as durable to-day as the day on which they were built. As, then, the live load is so much greater than it was, and as we have every reason to believe it will increase in the near future, it should be distinguished from the constant dead load and separately considered.

Believing that the general adoption of some modified form of the formulæ of Launhardt and Weyrauch is the most practical way of making this distinction, I have prepared the following tables. I would say, however, that Launhardt's formula is for prices subject to one kind of stress only (tension or compression) and takes the form:

$$a = u\left(1 + \frac{t-u}{u}\,\frac{\min B}{\max B}\right)$$

where a = safe working strength per unit of section under assumed condition of loading.

u = safe strength permit of section for any number of repetitions of load.

t = safe strength per unit of section for a single static load.

max B = the greatest stress upon the member, whether of tension or compression.

min B = the least stress of the same kind.

For spans over 150 ft., Mr. Theodore Cooper adopts a formula which reduces to the following modified form of Launhardt's formula:

$$a = u\left(1 + 3\frac{D}{\max B}\right)$$

where D = the stress, of the same kind as max B, due to dead load.

For reasons which I shall explain later, I would myself propose the following formula:

$$a = u\left(1 + 2\frac{\min B}{\max B}\right) \qquad (A)$$

The following are the values in pounds for wrought iron bridges of u and t for a unit of one square inch, proposed by the authorities named:

The values of $\frac{t-u}{u}$ are also given:

	Launhardt.	Weyrauch.	Cain & Wilson.	Du Bois.	Cooper.	Formula A.
u.....	11,430	10,000	7,500	4,500	5,000	5,000
t.....	17,130	15,000	15,000	10,500	20,000	15,000
$\frac{t-u}{u}$ ...	½	½	1	⅓	3	2

From this table it will be seen that for such pieces as floor-beam hangers, counters, etc., where the load is, or is considered to be, wholly a live load, the formula (A) allows a strain of 5,000 lbs. per square inch. In such cases the fatigue of the metal is as great as the fatigue of the metal in cranes, where a unit stress of 4,000 lbs. to 5,000 lbs. per square inch is considered to be good practice, so that I do not consider 5,000 lbs. at all too small for these cases.

Where the live load is so small compared with the dead load that it may be left out of account, we have max B = min B, formula (A) allowing in such cases a strain of 15,000 lbs. per square inch. This limit needs no comment, since it agrees with the best practice for such cases.

For intermediate values of $\frac{\min B}{\max B}$ Table I. will show how the different formulæ compare with each other.

TABLE I.

Showing the values of a for different values of $\frac{\min B}{\max B}$ according to the authorities named.

1	2	3	4	5	6	7	8	9	10	11
Min B / Max B	Gerber's Mainz bridge.	Launhardt.	Weyrauch.	Cain and Wilson.	Cooper.	Du Bois.	Formula A.	Standard.	Approx. correspond'g span.	Per cent. difference between weights due to cols. 8 and 9.
0	7619	11430	10000	7500	.....	4500	5000	...	.....	.....
⅛	8570	12400	10840	8750	.....	5500	6670	7700	20′	+ 15.7
¼	9420	13050	11430	9640	10000	6220	7850	10000	130′	+ 27.4
⅜	10150	13580	11880	10310	10620	6750	8780	10000	200′	+ 14
½	10840	14000	12220	10830	11670	7170	9440	10000	255′	+ 6
⅝	11420	14300	12500	11250	12500	7500	10000	10000	320′	0
¾	11990	14550	12730	11590	13180	7770	10450	10000	350′	— 4.3
⅞	12480	14770	12920	11880	13750	8000	10830	10000	400′	— 7.6
1	13720	15230	13300	12500	15000	8500	11670	10000	500′	— 14.2
1	22830	17130	15000	15000	20000	10500	15000	10000	.....	.....

TABLE II.

CALCULATED FROM FORMULA (3).

Showing strains in lbs. per sq. in. produced in the members of an existing bridge by an increase of rolling load from 3,000 lbs. to 4,000 lbs. per foot.

1	2	3	4	5	6	7	8	9	10
Min B / Max B.	Gerber's Mainz bridge.	Launhardt.	Weyrauch.	Cain and Wilson.	Cooper.	Du Bois.	Formula A.	Standard.	Approx. cor'espon'g span.
0	10150	15250	13330	10000	.....	6000	6670	...	.....
⅛	10940	15830	13830	11180	.....	7020	8510	9830	20′
¼	11650	16130	14140	11193	12370	7700	9780	12370	130′
⅜	12230	16370	14320	12450	12800	8140	10600	12060	200′
½	12820	16580	14480	12820	13800	8470	11170	11840	255′
⅝	13300	16660	14570	13100	14570	8740	11650	11660	320′
¾	13790	16730	14650	13330	15170	8980	12030	11510	350′
⅞	14190	16800	14700	13520	15630	9100	12330	11380	400′
1	15220	16900	14760	13880	16640	9430	12930	11100	500′
1	22830	17130	15000	15000	20000	10500	15000	10000	... ..

In Table I.:

Col. 9 gives the unit strains required by the usual or "standard" specification of 10,000 lbs. per square inch for spans over 80 ft., and adding a percentage for spans under 80 ft.

Col. 10 gives the approximate spans in which the stresses due to dead load would be to the stresses due to dead and live load as the given value of $\frac{\min B}{\max B}$

Col. 11 gives the approximate percentage of weight required by formula (A) greater than or less than the weight required by the "standard" specification (±) 14 meaning that the bridge in col. 8 would be 14 per cent. (heavier / lighter) than the bridge of Col. 9.

If to-day a bridge be designed to carry a rolling load of 3,000 lbs. per foot according to any of these formulæ, the question arises, what will be the unit stresses in this bridge when the rolling load increases to 4,000 lbs. per foot? This question is answered in Table II.

Looking at this table the question arises, how will the bridge designed to formula (A) compare with one designed to the "standard" specification when the rolling load has increased from 3,000 lbs. to 4,000 lbs. per foot. For spans up to 320 ft. the former will be the stronger, but for spans above 320 ft. it is lighter and weaker. If, however, this additional strength is neccessary (and if it is, why not for the shorter spans?) it can be secured with less weight by formula (A).

It will be seen from the tables that the bridge designed to formula (A) is practically as strong when the rolling load has increased from 3,000 lbs. to 4,000 lbs. per foot as a bridge designed to Messrs. Cain & Wilson's formula is when it is first built.

As has been already stated in a previous issue of the *Railroad Gazette*, on one road, at least, the rolling load has already reached 3,600 lbs. per foot, we believe that a bridge designed to formula (A) will have no more than necessary strength, while with the method of dimensioning we have advocated that strength will be secured at a minimum cost. Whatever the loads, this method secures the strongest bridge for the same cost.

It will be noticed from Table I. that formula (A) involves the greatest change from usual practice in the smaller spans. But even in the 130-ft. spans we only require an additional weight of 27.4 per cent. from that required by "standard" specification, which means an additional cost of about 9 per cent. But our bridge designed for a rolling load of 3,000 lbs. is stronger when the load reaches 4,000 lbs. per foot than the other is when first built; so that if it takes 9 years to change from a rolling load of 3,000 lbs. to 4,000 lbs., our bridge will have cost us during those 9 years 1 per cent. per annum.

I will not now take the space to discuss the formula proposed by Weyrauch for pieces subject to stresses acting in opposite directions, but would propose the modified form—

$$a = u\left(1 - \frac{\max B'}{2 \max B}\right) \qquad (B)$$

where u, as before, = 5,000.

Max B' = the greatest stress in the opposite sense to max B.

For the limits max $B' = 0$ and max $B' =$ max B, we have $a = 5{,}000$ lbs. and $a = 2{,}500$ lbs. respectively.

I believe that Mr. Joseph M. Wilson was the first to introduce in this country this method of dimensioning, and to him great credit is due for instituting such an important and necessary reform.

The following is a demonstration of the proposition by which the values in Table II. were found:

Let min $B = w$; max $B = w' + w$.

A = area of any particular piece considered, whether in tension or compression.

b = intensity of stress under any increased rolling load.

k = ratio of increased rolling load per foot to original rolling load.

Max′ B = the geatest stress upon the members after the increase in rolling load.

Then as designed

$$\frac{\min B}{\max B} = \frac{w}{w' + w} \qquad (1)$$

With rolling load increased we have

$$\frac{\min B}{\max' B} = \frac{w}{k w' + w} \; * \qquad (2)$$

Now max $B = a\,A$. Max′ $B = b\,A$.

$$\therefore\; b = \frac{\max' B}{\max B}\,.\,a.$$

$$\text{from (1) and (2)}\; b = \frac{k w' + w}{w' + w}\,.\,a. \qquad (3)$$

For Table II., $k = \frac{4}{3}$.

A. D. OTTEWELL.

The Gold Production of Thirty-six Years.

A late number of Herapath's *Journal* gives the production in the United States, Australia and Russia, the principal gold-producing countries of the world, as nearly 3,900 million dollars.

The production in periods of 5 years each, commencing with 1851, is given below, with the estimated production of 1886.

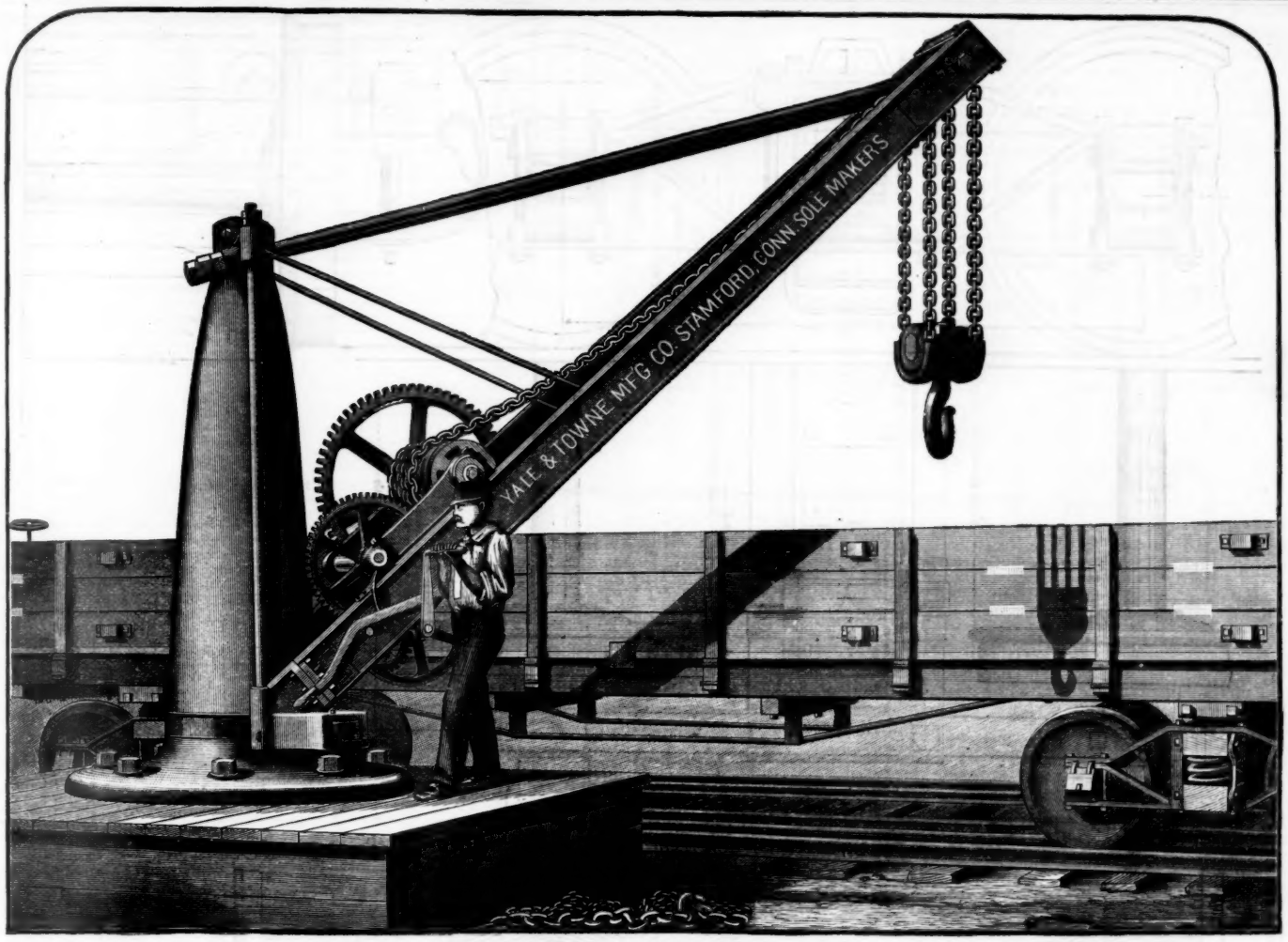
Five years including.	United States.	Australia.	Russia.	Total.
1855....	$297,438,011	$240,782,669	$2,874,688	$621,095,368
1860....	258,115,693	283,430,800	89,238 930	630,785,423
1865....	223.355,785	260,008,835	80,679,840	564,044,460
1870....	244,725,905	239,137,631	101,115,820	584,979,356
1875....	186,430,082	201,136,872	118,086,216	515,653,170
1880....	194,985,241	144,753,922	136,081,094	475,820,257
1885....	153,861,154	142,323,199	119,842,767	416,027,120
Year.				
1886	33,272,723	27,373,443	25,547,625	86,193,791
Total.	$1,692,184,594	$1,538 947,371	$753,466,980	$3,894,598,945

The effect of this upon the world's trade has, it appears to the editor of Herapath's, been more indirect than direct. "It has not, in our judgment, materially affected or assisted the transactions of commerce, but gold-producing countries have been endowed with floating capital which has enabled them to develop varied business operations and industries."

In this connection it might be of interest to mention that the estimated production of gold from 1492, the year of the discovery of America, to 1850, was 3,121 million dollars, and from 1850 to 1885, 4,184 million dollars.

The development of railroads in gold-producing countries, was in the United States, 1885, 127,729 miles, with a stock capital account of $3,817,697,729, and a funded debt of $3,765,727,066. Seven per cent. of this mileage had been built in 1850. Australia, in 1884, had 5,126 miles, with a total capital account of $259,118,240, all of which had been built

* This is true for top and bottom chords and web members at ends of truss, but only approximate for middle web members, since for these members min B is less than the strain due to dead load.



PILLAR YARD CRANE.

Made by the YALE & TOWNE MFG. CO., *Stamford, Conn.*

subsequently to 1855. Russia, in 1883, had 14,478 miles, with a capital of $1,176,182,480. Four and a half per cent. of this mileage only was built before 1850.

England, on the other hand, which has produced no gold since the discovery of America, had, in 1885, 19,169 miles of road, with $3,981,387,040 indebtedness, and in 1850 had completed 34½ per cent. of this.

Pillar Yard Crane.

The accompanying engraving represents a crane built by the Yale & Towne Manufacturing Co., for use in the Philadelphia yard of the Philadelphia, Wilmington & Baltimore. The crane has now been at work some months and is of 25 tons capacity and 15 ft. radius.

The crane embodies all the latest improvements in railroad pillar cranes, and is arranged with a special view to the safe handling of the load. It is provided with a patent safety brake, and an auxiliary band brake for quick lowering. Before the load can be again raised, this band brake must be thrown off, and the safety brake put on, so that the safety brake can never be left off by carelessness.

Several similar cranes capable of lifting the same weight, 25 tons, but of greater radius and height to head of jib, have been supplied to the following yards within the last few months: Washington, D. C. (Baltimore & Potomac); Engleside, Pa., and East Newark N. J. (Pennsylvania), and Pittsburgh (Pittsburgh, Fort Wayne & Chicago). We understand that the makers consider the 20 ft. jib better adapted to handle freight out of high sided cars.

Investigation of the Forest Hills Disaster.

We summarize the evidence taken by the Massachusetts State Commissioners in the investigation of the accident of March 14, on the Boston & Providence Railroad, between Forest Hills and Roslindale stations. The investigation is not completed as we go to press.

George H. Richards, Master Mechanic of the Boston & Providence testified. The telescoping indicated some kind of breakage in some part of the train. The cars were badly telescoped and then pulled apart. He thought the cause of the accident was an obstruction of some sort, as the dropping of some part. Any derailment must have begun on the bridge, as the track south of the bridge showed no marks on the ties or the ground. The first marks on the sleepers were some 40 feet back of the north abutment, and the cars must have been off the tracks at the abutment. He thought there might have been a settlement of the bridge, and consequent derailment. The bridge must have gone down before the third car got to the abutment. The third car must have crushed into the second before that, perhaps when the second struck the abutment. Mr. Crocker—What is there inconsistent with the theory that the bridge settled somewhat under the engine, derailing the first cars, and the others following, and taking the last ones down in its fall? A.—In that case I cannot account for the telescoping of the second and third cars. Such a telescoping could only be caused by the bridge going up—which we know it did not—or the rear part of the train rushing on to the forward part, as it does when the forward part meets a sudden obstruction. The bridge must have been in position when the engine struck it and when it left it, because the engine didn't leave the rail. Q.—How do you explain the testimony of the engineer that he felt a shock to his drivers and that the forward end of his engine came up; A. I think no man can tell which end or where a shock comes from; if the forward part of his engine had gone up much, I think engine, tender and all would have gone off the bank, owing to its weight. Witness testified that the locomotive was new, and weighed 82,000 to 83,000 pounds; tender, at the time, 56,000 pounds. The first car was good as new, the second a poorer one, the third an old one, and the others were good strong cars. Cars on this branch were examined two or three times a day. He found a broken journal on car 87; broken at the shoulder. He did not know that he had discovered any defects in the bridge. He had seen a piece of cast-iron that showed some rust in a break, did not know what part of the bridge it was from; had seen no fracture that would be important or dangerous; was not posted in the special construction of this bridge. The axle and wheels from which the journal was broken were now in the shop. If this journal broke on the bridge or just before going on the bridge it would cause a severe shock and possibly a breaking of some of the parts of the bridge and its fall. But the journal was on the fifth car and this theory would not account for the telescoping of the forward cars. [The bridge was about 104 ft. long, and the four cars ahead of that with the broken journal would be about 180 ft. long. —ED.] The accident might have been caused by dropping of a brake beam under the first or second car. The bridge changed its position at the instant between the passage of the tender and the trucks of the first car from the bridge to the abutment.

Mr. Harlan W. Brook testified to having seen, in 1882, loose nuts hanging below the bridge, and rods from which the nuts were gone.

Edward Lang, Chief Car Inspector, testified that the cars were as good as any on the road.

Mr. G. F. Folsom, Superintendent of Construction, testified that the last examination of the bridge had been made in February, and everything found correct. He believed the bridge to be thoroughly made in every particular, and he had not a doubt about it. The support of the floor depended on the stirrup irons, and those were in such a position that they could not be inspected. He was present but little at the construction of the bridge, and trusted wholly to Mr. Hewins. The guard outside of the rail was, he thought, a 3-inch plank 10 in. wide. The contracts called for a superior class of iron, but that was all left to Mr. Hewins. The specification and contract were not submitted to a bridge engineer; none was present at the test, or had examined it since. As the bridge carried the locomotive and three cars over he did not think the failure of the bridge the original cause of the accident. It was probably a derailment.

Edmund H. Hewins, who in 1876 built the west truss and connected it with the older one, which was moved across to the south side, testified that the name "Metropolitan Bridge Company" was adopted by him in the hope of forming a company, which was never formed. The main tension bars of this bridge were made by the Phœnix Iron Co. and the rest of the material by the Trenton Iron Co. The bridge was calculated to carry 3,000 lbs. to the lineal foot and was fully capable of that strain.

The work was done in conformity with the specifications. The corner blocks were of cast-iron. The broken one was as good for service to-day as it ever was. No inspection of the Bussey bridge was made on behalf of the company that he knew of. He (Hewins) inspected it as much as any bridge that was built was inspected. The hangers were in such position that they could be only partly examined. Being asked what was the exact cause of the accident, witness replied: I am unable to make up my mind. In general, I believe it must have been either a derailment or a breakage of some part of the rolling stock. I have no opinion what it was that broke. The break in the hanger evinced to witness's mind the leverage which it got from the floor beam. They were fresh breaks and he thought they were caused by the fall. He thought neither of the hangers was broken before the accident happened. Questioned about a certain bridge built by him on the Boston & Maine, witness said it was knocked down by a derailed train. Being shown the broken hangers he saw no indication, except the fact of the breakage, that the iron was poor, though in one place the iron seemed to have been overheated.

A letter written by the Railroad Commissioners to the Superintendent of the Boston & Providence road after their inspection in 1881 was read. It criticises several bridges on the road, and concerning the Forest Hills structure says:

"The superstructure of this bridge is an oddity among bridges. If it has never been tested under a given load the commissioners suggest whether it would not be wise and prudent to test it now, and perhaps at stated intervals hereafter. * * * The test to consist in putting on a load somewhat heavier than the bridge is ever called upon to bear in the course of your business, noting the load put on, the deflection and the amount of recovery after the load is removed. Note also its lateral stiffness and strength. A series of such records would show conclusively whether or not the bridge tested was maintaining its strength and safety."

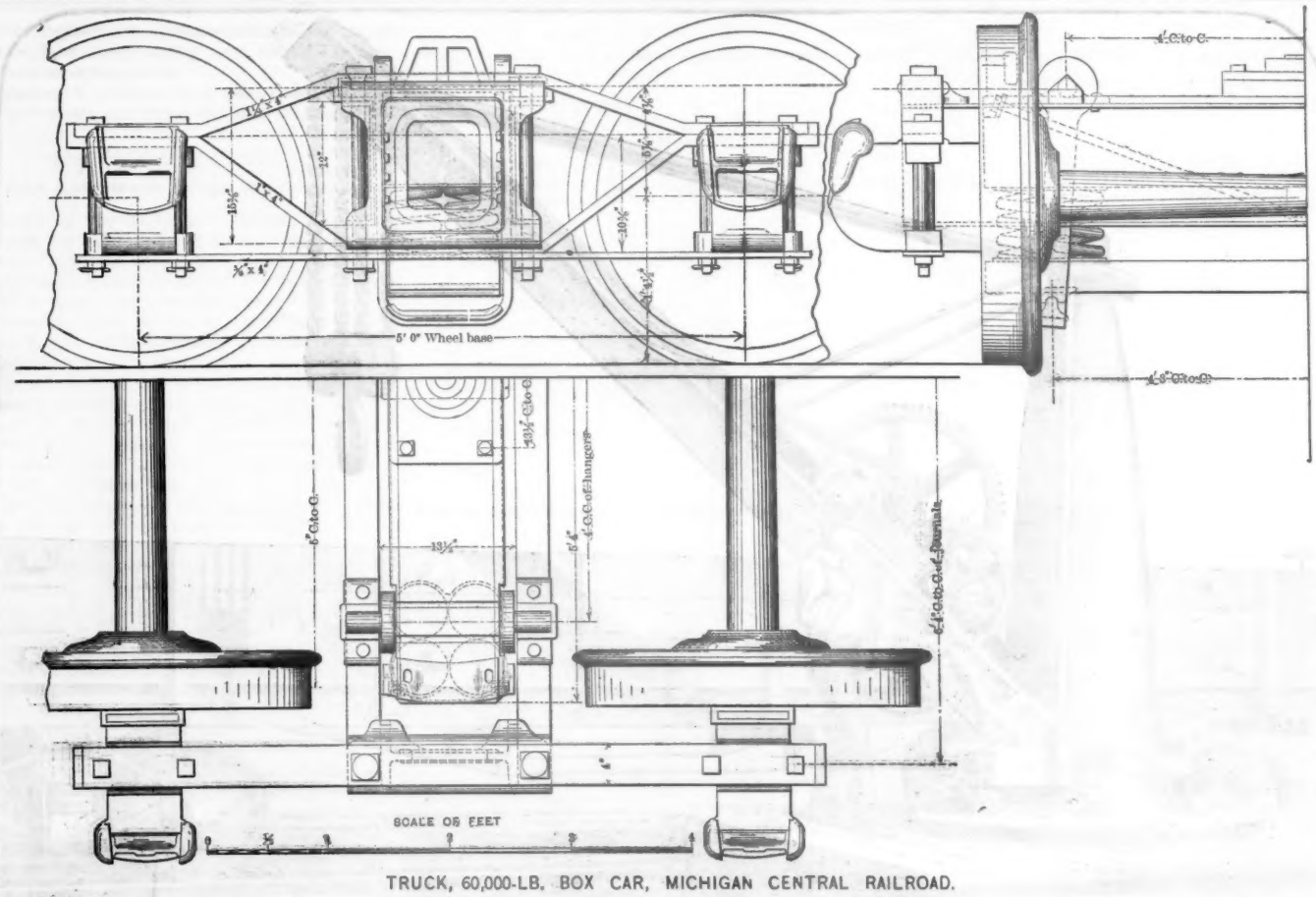
Theodore B. Moses, civil engineer, regarded the bridge as a mechanical deformity.

James K. Reed, a passenger in the second car, was positive that the rear of the car settled first, and not until after the forward portion had gained the east abutment.

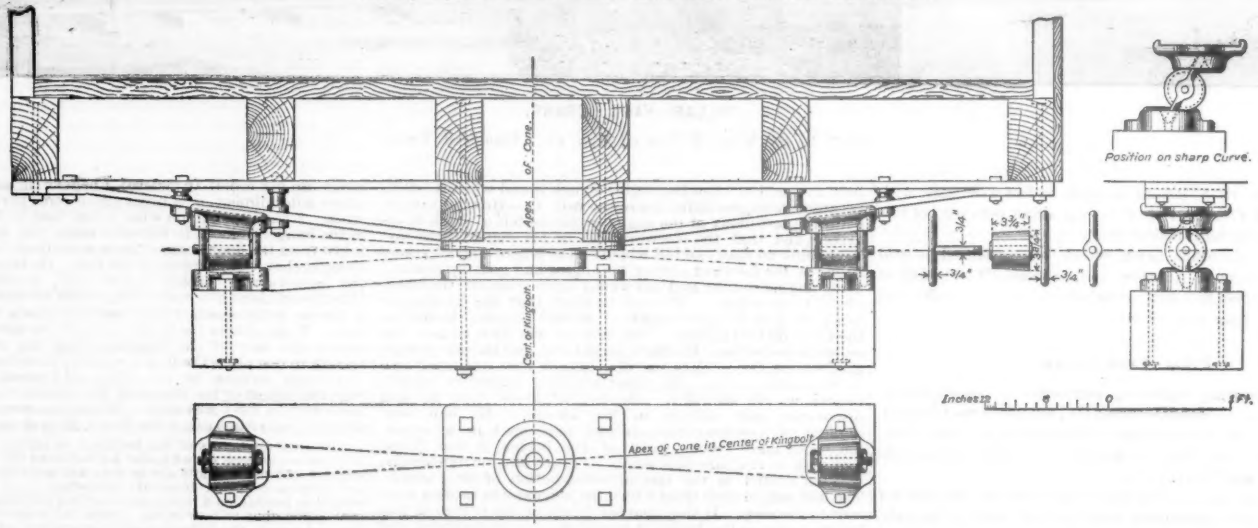
Henry F. Shaw, mechanical engineer, has had doubts in regard to the strength of the structure, caused by lateral vibrations he had noticed when crossing in the cars.

A. A. Folsom, Superintendent of the road, has been on the road since 1854. He and George Folsom decided what pattern of bridge to order. The bridge was given a severe test before being put into service, and was then watched. Witness went out to see it, and he rode over it very often, always riding in the rear car. He has always thought that it was an excellent structure, solid and substantial. No complaints in regard to its safety have been made. Once there was a communication sent to him that there were one or two nuts off, and he notified the bridge superintendent, who afterward said there were a couple of nuts gone, but that they did not affect the safety of the structure, being ornamental rather than useful. The bridge was given a special test in 1882 at the suggestion of the Railroad Commissioners. (Here Commissioner Crocker read the letter referred to above.) There has been no test since, but the bridge has been watched when trains were in motion upon it. He never saw any lateral sway. There was never any high rate of speed on the bridge, but there is no limit by rule to the speed. There was such a limit for the old bridge. As to the probable cause of the accident, witness thinks something got down from one of the cars. The appearance of the breaks in the hangers, which he thought were fresh with the exception of a corner of one break and a half of another, did not change his opinion as to the cause of the accident. There is an iron brake beam that enters into the case and there is a broken journal. Either one of those would be sufficient to destroy the bridge under certain circumstances. It would not make any difference where the break occurred on the bridge. He did not see how the journal could have been broken in the falling down. Two special tests of the bridge were made, one in 1876 and one in 1882. After the last special test no changes in the bridge were made. Guard rails on a bridge he regards as very dangerous.

H. A. G. Pomeroy, civil engineer, testified. On the morning of the accident he found on the southern abutment a broken brake rod bent in horse-shoe shape, and had heard that a brake hanger had been found on the track 300 feet



TRUCK, 60,000-LB. BOX CAR, MICHIGAN CENTRAL RAILROAD.



SUSEMIHL'S ANTI-FRICTION SIDE-BEARING, 60,000-LB. FREIGHT CAR, MICHIGAN CENTRAL RAILROAD.

south [west] of the bridge. This may have derailed a car and caused the fall of the bridge.

Martin Lynch testified. He was watching the train when it fell; thinks no dropping of the bridge was discernible until the first two or three cars had got across.

Master Mechanic Richards was recalled to identify a piece of a rail found between the first and second cars at the time of the accident by W. W. Williams, and referred to by him in his testimony. Mr. Richards thought this was the south rail at the east end of the bridge, resting partly on the embankment, and that it may have broken under the engine or before that, and been the means of derailing the second car or tearing the trucks from it. Thinks this rail, which is now bent, must have given the severe blow which was found to have been received by the forward truck of the second car.

The investigation was continued to March 25 to allow of more careful investigation of the pieces of this rail.

Sixty-Thousand-Lb. Box Car—Michigan Central Railroad.

The accompanying illustrations represent a new 60,000-lb. freight car, designed by Mr. Robert Miller, Master Car-Builder of the Michigan Central Railroad. The first car of this pattern was built at the Detroit shops of the Michigan Central Railroad in November last.

It will be observed that both the body and the trucks have been considerably strengthened as compared with the usual style of 40,000-lb. box car. The plates are unusually heavy and are supported over the double body transoms by two posts. In order to distribute the strain a stout corbel is placed between the ends of the posts and the under side of the plate. The body framing is likewise considerably strengthened, both as regards the scantling of the posts and braces and the depth of the truss formed by the side. The height from the top of the sill to the lower side of the plate being no less than 7 feet, the side forms a very deep truss and has great vertical strength, and is enabled to carry the greater part of the weight on the floor.

The floor is well supported, the truss rods being placed lower than usual giving a greater depth of truss. This is a feature that might be introduced with advantage on many cars, the supporting powers of many of the shallow trusses used being very small in proportion to the tension on the truss rods, while a slight elongation of the truss rods by strain or by the expansion in hot weather allows the floor to sag.

The truck transoms are channel iron 12 in. deep. The arch-bars are 4 in. wide, the top arch-bar being 1¼ in. thick, while the lower or inverted arch-bar is 1 in. thick. The column bolts connecting the arch-bars, etc., together are 1¼ in diameter, and are countersunk under the head, a very necessary precaution in such large bolts. Where this is not done, the heads are very liable to fly off under strain, the metal being virtually "nicked" under the head. The fillet under the head makes a strong junction between the body of the bolt and the head, and is, of course, easier to make, as the metal in forming the heads flows more easily.

The arch-bars do not rest directly on the flange of the channel-iron transoms, a stout cored flange of the transom casting being interposed. On examining trucks that have been running only a short time, it will often be found that the channel-iron transom is cracked at the root of the flange where it rests directly on the inverted arch-bar. The bend of the arch-bar throws the whole strain on the extreme outer edge of the flange, and consequently the flange gives way at the root.

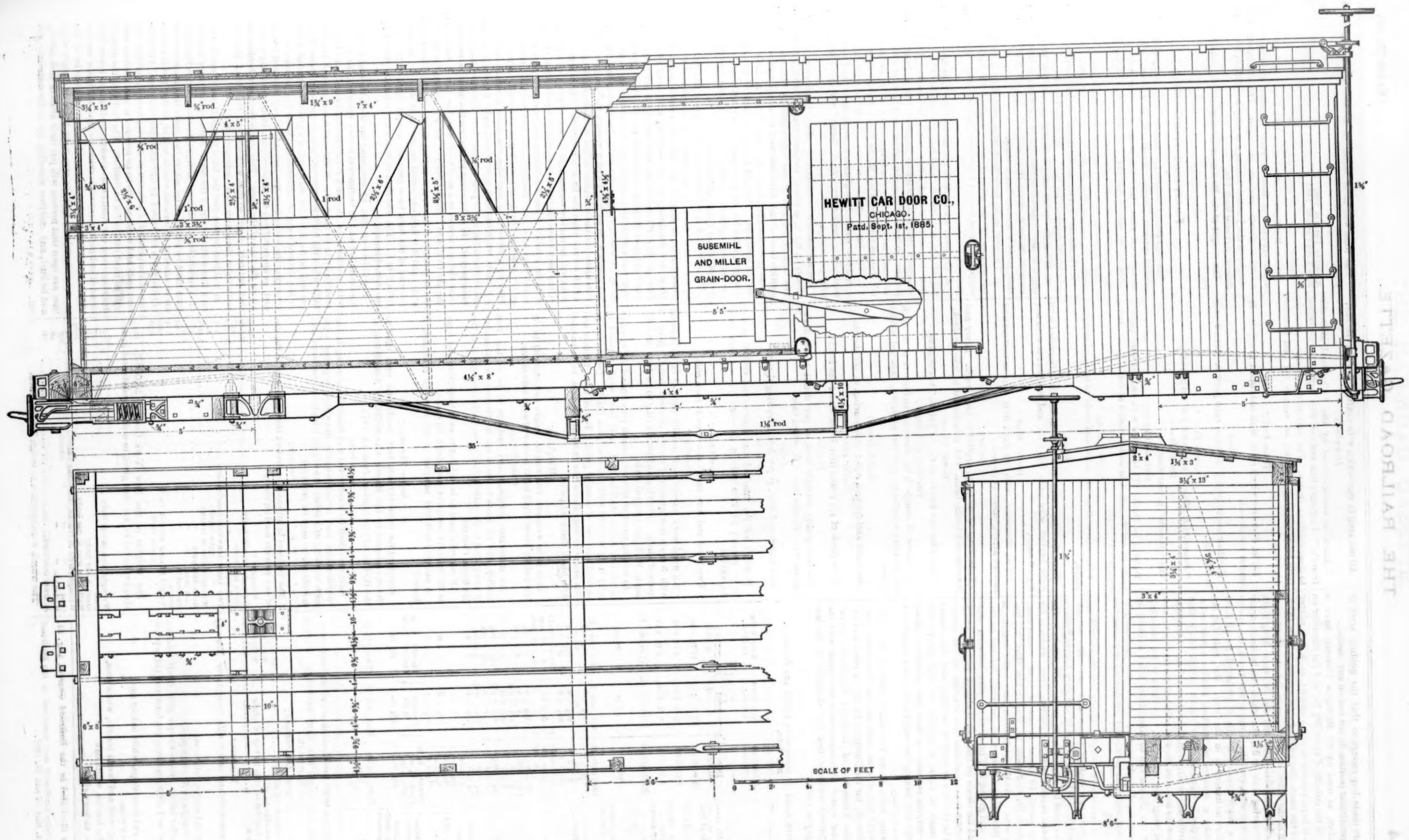
The interposition of a stout casting distributes the strain over the whole width of the flange and prevents any bending and cracking, which, of course, cause the truck to work loose.

The swing motion arrangement is clearly shown on the drawing.

The journals measure 8 in. × 4 in., and the brasses are considerably heavier than usual.

The detail drawing shows the Susemihl anti-friction side-bearing which has been adopted by the Michigan Central, and has been substituted for the rigid bearing, as shown in the engraving of the truck. This new bearing has been specified for all new 60,000-lb. freight cars after sufficient tests of its value. It is quite a different thing from the wheel-bearing, which has been often tried and discarded. The wheel-bearing will wear flat, as the diameter of the wheel cannot be made large enough in proportion to the heavy axle necessary to carry the load. The new anti-friction roller-bearing cannot help turning at every independent motion of the truck, because the transom casting pulls the periphery of the roller in one direction, and the casting on the truck bolster pulls the roller at an opposite line, in the opposite direction.

The roller is made cone-shaped, or in other words, it is the frustum of a cone whose apex lies in the centre of the king-bolt. The top and bottom plates, over which it travels, are of shallow, cone-shaped form also, so as to supplement the angle of cone of roller, therefore the movement of the roller is in a circle around the centre of the truck, and any twisting and sliding of the roller is thus avoided. There is a true rolling motion, consequently a minimum of wear. If the roller were placed loose between the plates it would, through little accidents, move too much one way or the other. Therefore the guiding arms are placed so as to control the movement at any instant. The arms are made in the form of an H, the one arm set loose (or over thread, as shown in the engraving) on the middle bar, which runs through the centre of the roller, thereby giving the outer arm a chance to tip and incline a trifle more than is required for the inner arm. All four arms are inserted into flaring pockets in bearing plates, made in such shape that arms touch constantly one side of pocket; the upper casting pulling arms in one direction, the lower casting carrying the opposite arms in the opposite direction. As the arms are of equal length and pockets of same size the middle bar controlling the travel of roller will stand at any moment on the true dividing line of angle formed between car and truck, and tend toward the centre of king-bolt. Th



SIXTY-THOUSAND-LB. BOX CAR, MICHICAN CENTRAL RAILROAD.

Designed by MR. ROBERT MILLER, *Master Car Builder.*

pockets are made deep enough so that the guiding arms in their perpendicular position do not rest on any casting.

The rollers, as used on the Michigan Central, have a diameter on the outside of about 3¾ in., and the diameter on the inside is in proportion as much smaller, as it lies nearer the apex of the cone. The guiding arms are made ⅝ in. thick. The length of the roller, so as to leave the necessary play between bolster and side-irons, and also between hanger-pin and lower bearing plate, is 3¾ in., which can be made larger if hanger-pin is set nearer the centre of the truck, or can be made of a much greater length, if preferred, for all rigid trucks where no hanger is in the way. But tests for six months under a number of coaches, and for a year and a quarter under a way-car, have shown satisfactorily that there is hardly any wear, even for a short roller. All rollers running now do not even show a polished surface yet, and look just as when they were cast. As there is no fastening to truck or car, the car can be raised from truck as easily as with ordinary rigid block bearing. It is only necessary to watch the perpendicular position of guide-arms in setting the car on the truck.

The cost in excess over cost of ordinary bearings is trifling. The castings for two shallow plates and one roller do not exceed in weight the two castings of ordinary bearing where heavy blocks must be carried up to meet each other. The only additional expense is in the guiding arm, which is for each bearing about 19 linear inches of ¾-in. round iron, which weighs to the foot about 1½ lbs., or less than 2½ lbs. per bearing arm. As the friction on this roller bearing is very small there is no necessity of carrying the car on the centre-plate and giving it ⅛ in. or ⅜ in. play between side-bearings, and the strain on transom is almost entirely avoided. The friction is so small that the friction on the centre casting will be the only obstacle in curving, and this should be made as small in circle as possible or done away with altogether, carrying car only on these two sensitive outside roller bearings and making the centre plate only a guide for swiveling and pulling.

The following table shows the relative sizes of the scantlings of this car and of a car built by the Peninsular Car Works, of Detroit, for the Northern Pacific in 1883, and exhibited at the Exposition of Railroad Appliances, held at Chicago in that year.* A comparison is also made with the New York Central standard box car designed by the late Leander Garey in 1882.†

COMPARATIVE TABLE OF DIMENSIONS 40,000 AND 60,000-LB. BOX CARS.

	Michigan Central.	Northern Pacific.	New York Central.
Year first built	1886.	1883	1882
Capacity	60,000	40,000	40,000
Length outside of end sills	35 ft. 0 in.	33 ft. 8 in.	34 ft. 0 in.
Width outside of side sills	8 ft. 6 in.	8 ft. 0 in.	8 ft. 6 in.
Height top of sill to under side plate	7 ft. 0 in.	6 ft. 4 in.	6 ft. 1 in.
Cube formed by above dimensions	2082 cub. ft.	1709 cub. ft.	1758 cub. ft.
Height from top of floor to top of middle girt	48 in.	40 in.	38 in.
Cubic contents inside to level of top of girt	1081 cub. ft.	812 cub. ft.	847 cub. ft.
Sills, centre	4½ × 8	4¾ × 8	4¼ × 8
" intermediate	Four	Two	Four
" side	4 × 8	4¾ × 8	2½ × 8
	4½ × 8	4¾ × 8	4¼ × 8
Body transoms	Iron, double 5 × ⅝ in. top. 5 × ¾ in. bot.	5 × 16	Iron, single 8 × ½ in. top 8 × ⅝ in. bot.
End sills	6 × 8	5½ × 8	5 × 9¾
Cross ties	4½ × 10	4 × 8	4 × 7½
Draft timbers	4 × 8	4¾ × 8½	....
Si le plate	4 × 7	3¾ × 6	3 × 6
Side door-posts	⅝ × 4½	4½ × 4½	3¾ × 4½
Corner posts	4 × 4	4 × 4	3¾ × 5½
End posts	3¼ × 4	3½ × 4½	3 × 3
Intermediate posts	2½ × 5	2½ × 4	2 × 4
Main body posts	Double 2½ × 4	....	...
Braces, side and corner	2½ × 6 2½ × 5	2¼ × 6	2 × 6
Braces, end	3¼ × 4	2½ × 4	3 × 3
Framing rods, number and diameter	Twenty, ¾ in. Four, ⅞ in. Eight, 1 in.	Twenty, ⅝ in.	Twelve, ¾ in. Twelve ⅞ in.
Flooring, thickness	1¾ in.	1¾ in.	1¾ in.
Body truss rods, number and diameter where plain	Four, 1⅛ in.	Four, 1⅛ in.	Two, 1¼ in.
Siding, outside	1 in.	....	⅞
" inside	⅞ in.	....	⅞

The following is a brief specification of the car illustrated:

SPECIFICATIONS FOR 35-FT. BOX CAR, MICHIGAN CENTRAL RAILROAD.

General Dimensions:

Length of car outside of sills ..... 35 ft. 0 in.
Width of car outside of sills ..... 8 ft. 6 in.
Height of car, bottom of sills to top of plate ..... 8 ft. 3 in.
Wheel-base truck ..... 5 ft. 0 in.

Timbers:

Outside, intermediate and centre sills, Georgia or Norway pine.

End sills and end plates, white oak.

Side plates, Georgia or Norway pine.

Cross ties, buffer blocks, brake hanger girts, draft timbers, all posts, braces and girts, carlines, purlines and ridge poles, white oak.

Door frames and door stops, white oak or ash.

Floor, Norway pine.

Ceiling, lining, roof and fascia boards, white pine.

All timbers for trucks, white oak.

Brake beams, hickory elm.

All blocking in connection with draft timbers, white oak.

Drawbars:

"Ames," as manufactured by the "Cleveland Malleable Iron Co." Cast-steel link and cast-iron buffer blocks bolted to deadwoods as shown. The uncoupling device operating from *below* drawbar as shown on sample car and detailed drawings.

Truss Rods:

1⅛ in. diameter where plain, with ends upset to 1⅜ in. diameter for thread.

Floor:

For floor use 20-penny cut nails, each piece to have 2 nails in each sill.

Grain Door:

"Susemihl & Miller," with cast-iron threshold.

Outer Doors:

The "Hewitt" patent door.

Outside Ceiling:

To be ⅞ in. thick. To be nailed with barbed wire nails, 5 nails in sill 2½ × 9, 4 in middle and 3 at top 1⅞ × 10, and 3 in brace 1⅞ × 10.

Inside Lining:

4 feet above floor on sides, and ends to be lined to upper plates.

Roof:

To be the "Hutchins" roof, bottom boards to be nailed with eight barbed wire nails, 1¾ × 10, and top boards with ten 3¼ × 6 nails.

Brake Mast:

1⅝-in. diameter, with wrought iron step at bottom and ratchet arrangement as shown.

Brakes:

To be hung to car body, applied to one truck. Lever and jaws on each brake beam, with attachment to take up slack.

Brake Shoes:

To be what are known at the "Christie" brake shoes.

Ladders and Steps:

As shown, 6 rounds ⅝ in. diameter and one step on each side, 2 safety handles on each end as shown, fastened solidly to post.

Side-bearing:

Susemihl anti-friction roller side-bearing, as per sketch.

Center Pins:

To be made of 1¾ round iron 16 in. under the heads.

Trucks:

Use best quality wrought iron, as per detail truck drawings shown. Trucks have 5 ft. wheel-base.

Axles:

Best hammered iron, as per detail drawing shown.

Wheels:

To weigh 560 lbs., marked and guaranteed 60,000 miles, to be pressed on axle with a pressure of not less than 60,000 lbs.

Card Cases:

Two wood and wire card cases—one at each end.

Painting:

All wood-work (except roof) usually painted to be covered with 3 coats best quality Prince's Mineral paint. Roof, 2 coats of same. Lettering and numbering to be done according to Michigan Central style.

In mixing paint no thinner, except pure linseed oil, turps or turpentine Japan shall be used. All iron work exposed in body to be covered with one coat gloss black. Trucks to be painted one coat of mineral paint. Top of floor timbers and sills under ceiling, also all mortises and tenons, to be painted with black diamond paint.

Weighing:

Cars to be weighed, and weight, length and capacity to be marked on lower right-hand corner of each side of car.

Conditions:

All materials, forgings and castings to be of the best quality, and all work to be done in the best workmanlike manner, and to the satisfaction of an authorized agent of the Michigan Central.

All material used to be subject to such inspection and tests as the railroad company may desire to make.

A sample truck and samples of all castings furnished if desired.

Screw Threads:

Standard for screw threads, bolt heads and nuts shall be the one adopted by the Master Car-Builder's Association at the Richmond Convention, June 15, 1871.

Drawings:

Said cars shall be constructed and finished according to the specifications and accompanying drawings, together with such working and detail drawings, templates, patterns and sample car as may be provided.

Patents:

The builders in all cases to protect this company in the use of any patents used on the car.

WEIGHTS:	Lbs.
Wrought iron in body	2,589
Bolts and nuts "	427
Cast iron "	1,358
Two Ames drawbars (malleable)	254
" links (steel)	112
Wrought iron in trucks	1,908
Bolts and nuts "	150
Cast iron "	1,910
Malleable "	56
Brass "	114
Weight of cast wheels, each	560
" axles, each	430

The weights of the New York Central 40,000-lb. car, above referred to, are thus given in a slightly different form:

	Lbs.
Wrought iron in car body	2,552
Cast " "	797
Steel in car body	104
Malleable iron in car body	13¼
Wrought iron in trucks, including axles	3,144
Cast " " " wheels	5,366
Malleable " "	48
Journal bearings	80

The wheels were specified to weigh 525 lbs. each.

The total weight of *metal* in the two cars is about as follows:

	Lbs.
Michigan Central, 1886	15,098
New York Central, 1882	12,104
Excess	2,994

As the Michigan Central car is both larger and stronger, it would appear that these desirable qualities are attained with a very moderate increase of weight. The difference in the weight of the journal bearings is very noticeable, and should largely increase their life.

The weight of the Michigan Central car complete is 27,850 lbs.

Forney's Improved Car-Seat.

The engravings herewith represent the latest form of an improved car-seat designed by Mr. M. N. Forney. Fig. 1 is a perspective view, fig. 2 a front elevation with a section through the side of the car and window, and fig. 3 an end view with the seat-end removed.

The following are the advantages which result from the method of construction shown by the engravings:

1. The backs can be made of any desired height, so as to give ample support for the heads of passengers.

2. While the backs can be as high as required, their lower edges do not come below the tops of the seats, so that there is more room between the front edge of each seat and the back than there is with ordinary seats.

3. The seat-backs have projections which support the lumbar regions of the spine or the "small of the back," where support is most needed to prevent fatigue while in a sitting posture.

4. The seats are made to incline backward, so that the jolting of the car has no tendency to cause their occupants to slide off of them and away from the backs. Very little muscular effort is therefore required to maintain a sitting posture, so that persons can rest or sleep in these seats almost as comfortably as they can lying down. The inclination of the seats is reversed when the backs are turned over.

5. The backs can be reversed in less space than those ordinarily used. The motion is much easier, and there is no tendency to come down with a "bang" when they are turned over carelessly.

The mechanism employed to effect these ends is shown clearly in fig. 3, in which the seat-arm or "end" is removed. The back B' and seat S' are represented by full lines in the position they occupy when the back is turned half way over. These parts are also shown by dotted lines in their two reversed positions. The back has projections D' and E, E' and D which, when the back is turned over, alternately support the lumbar region or "small of the back" and the head and neck of the occupant of the seat.

The seat-back is reversed from the one position represented by the dotted lines to the other by means of two pairs of crossed links, or arms, L L'—one pair at each end of the seat. These are connected to the seat-end and side of car by fixed pivots P P', and to the seat-back by other pivots p p'. The links project below the fixed pivots P P', and each of them has a projecting pin or stud s s' (shown by dotted lines in fig. 2) which support the seat. The seat or cushion-frame has slots n n' in each end which receive the pins s s'. These slots allow for the variation in the distance apart of the pins which occurs when the back is reversed. The action of these links will be readily understood if we follow the movement of the back from the position shown by dotted lines at B, fig. 3, to the position when it is turned half-way over, represented in full lines at B', and finally to that indicated by dotted lines at B'', when the back is completely reversed. The dotted lines o p q and o' p' q' represent the paths in which the pivots p p' move when the back is reversed, and r s t, r' s' t' are the paths which the lower pins or studs s s' describe during the same period. It will be seen that when the back is reversed from the position shown at B to B'' that the pin s moves in the arc t s r, and s' moves from t' to r'. When the back is in the position B the seat is in that shown by the dotted lines a^t S'', and it is then supported on the pins at t t'; with the reversal of the back these pins are moved from t to r and from t' to r'. The seat then occupies the position shown by the dotted lines S.

It will be seen that, by reversing the back, the seat is moved horizontally; and its inclination is also reversed, so that in both positions of the back it inclines backward, which adds materially to its comfort. If the seat is not moved horizontally when the back is reversed, more room lengthwise of the car will be required for each seat of a given width and a back of any desired form or inclination. With this mechanism for reversing the backs they can be made of any required height, and, as appears from the illustrations, their lower edges come above the tops of the seats. This leaves the space behind the seat entirely clear, so that with seats of this kind there is more room than with those ordinarily used.

It will also be seen that the fixed pivots P and P' are located on a line with the top of the seat. With the ordinary method of reversing backs, the seat-arm pivots about which the backs turn must be placed so far above the seats that the arm-rests are elevated at an uncomfortable height, so that the shoulders of passengers are raised up into an uneasy position. The location of the pivots P P', shown in the engravings, permits the arm-rests and window sills to be lowered to any position that will be most conducive to comfort. The fact that the arms of drawing-room car chairs are always made much lower than those of ordinary car-seats is evidence that the latter are too high. But if the window sills are lowered so as to be of the most comfortable height for arm-rests, there is danger when they are open that persons will put their arms or feet outside and be hurt, and children standing up on the seats may fall out.

* This car was illustrated in the *Railroad Gazette*, Aug. 31, 1883.

† This car was fully illustrated and described in the *Railroad Gazette*, April 14, May 12 and 26, 1882.

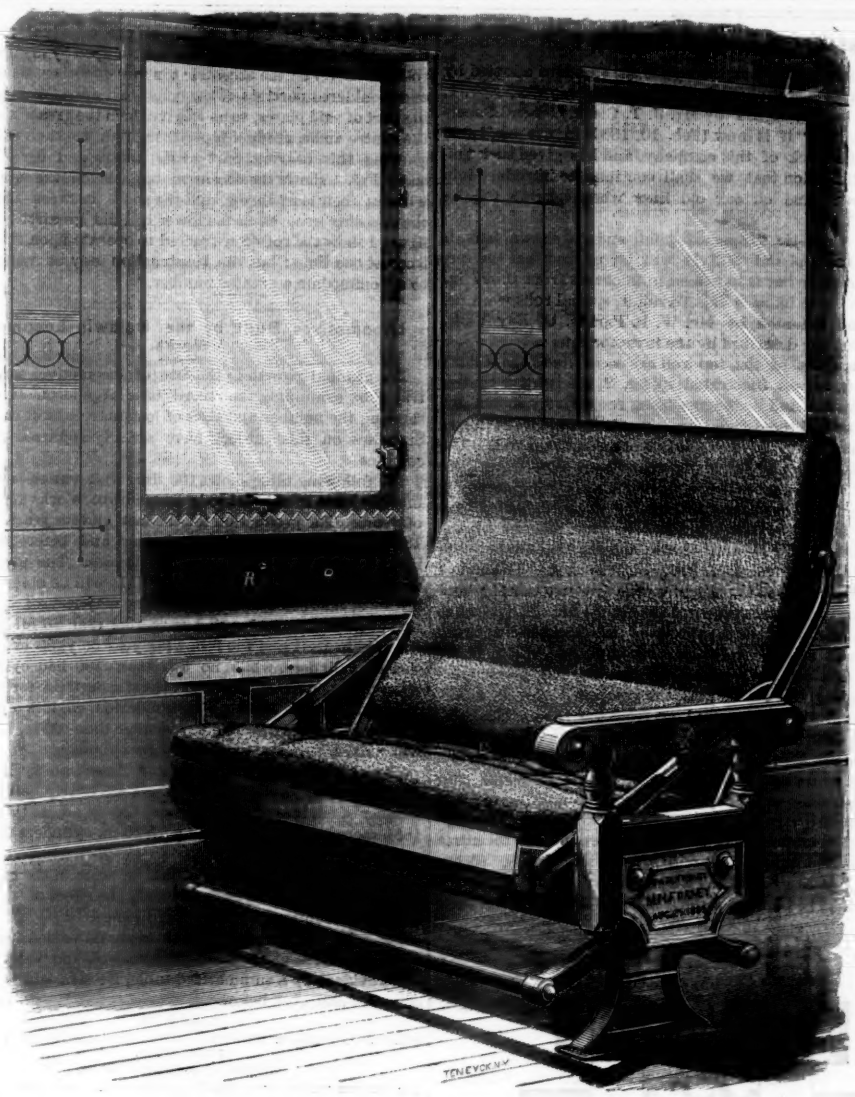


FIG. 1.—FORNEY'S IMPROVED CAR SEAT.

For these and other reasons, the method of construction shown in figs. 1 and 2 has been devised. The window ledge *M*, fig. 2, has been placed 24 in. above the top of the floor. This is just about the height of a drawing-room car chair arm. Under the window *W*, a recess or pocket *R* is constructed, which is flush with the outside of the car. This make the ledge *M* wide enough for a comfortable arm-rest, or it can be used as a shelf to hold books or packages. As shown in fig. 1, the crossed arms come so low down that they are not in the way of a person occupying the seat, and as the recess or pocket *R* gives sufficient room for the arm of a passenger, he or she can sit close up to the side of the car without discomfort.

The result is that in effect, the seat, crosswise of the car, is, with this arrangement, practically lengthened three or four inches. When the windows are up, there is little liability of passengers putting their arms outside of the car, because the recess gives them a more comfortable rest than the window sill above it does. The window recess and this form of seat together, it is thought, will give more room and comfort to passengers than any other arrangement yet devised.

Any further information can be obtained from Mr. M. N. Forney, 23 Murray street, New York, or from the Dayton Manufacturing Company, Dayton, Ohio, who have just made arrangements to make the seat.

Heating and Lighting Cars.

The regular monthly meeting of the Master Car-Builders' Club was held at the rooms of the club, No. 113 Liberty street, New York, on the 17th inst. Mr. C E. Garey presided, and there was a very full attendance of members and visitors.

It was resolved to postpone any change of the name of the club until October. The President announced that the committee had taken the present rooms for a year from May 1, 1887.

Mr. C. A. Smith proposed that Mr. C. E. Garey be formally elected president of the club, which was carried unanimously.

The President, after returning thanks for his election, announced that the subject for discussion would be the Heating, Lighting and Ventilation of Cars.

Mr. W. T. WOODWARD (Sewall Heater Co.) proceeded to give a very clear and lucid description of the principles of this heater, which is in use on the Maine Central with successful results. He argued that if it answered well in northern Maine it would warm cars effectively in any part of the United States. They used ¼ in. steam pipe running through the train and well-protected wherever it was exposed to the weather. With a view to simplicity no reducing valve was used; a simple angle globe valve on the engine being found sufficient. One-eighth turn of this valve that took 10 turns to be fully opened would give a sufficient supply of steam to heat the train.

The pipe runs under the centre of the car. A patent valve is placed under the floor in the centre of the car, operated by a disk, which can be moved by a key in the possession of the brakeman, who can thus regulate the amount of steam admitted to the heating pipes inside the car. The steam passes from this central valve to each side of the car; thence through radiators at the ends of the car back to the centre, thence to the main pipe and on to the next car.

By partially opening the valve referred to above part of the steam goes directly into the radiating pipes inside the car, and part goes directly on to the next car. It will thus be seen that the heating is regulated by what is known as a "by-pass."

Either the whole volume of steam or any part of it can be made to circulate through the car, and the surplus goes directly to the end of the car without passing through or doing any heating. Thus the temperature of each car can be regulated without interfering with the temperature of any other car.

In actual practice the controlling valve enables cars to be kept at an even temperature of 69° to 70° when the thermometer is 30° to 35° below zero. The cars can stand all night without any attention. The condensed water from the steam pipes is trapped and let off by a thermostatic device. A hot well for the condensed water is provided under the car, with a fire-box underneath the hot well. A fire can be lit in this fire-box if required, so that the car can be kept warm when standing detached from the engine. The fire can be dumped instantly by means of a drop grate.

The special claims on behalf of the Sewall heater are that it is simple and the heat can be easily regulated; while due provision is made for heating the car when the engine is disabled or before it is attached to the train.

Some gentlemen proposed to render stoves safe by incasing them with boiler plate or providing them with automatic fire extinguishers. But, granting that either of these devices answered perfectly, a heavy stove would still remain a dangerous missile in case of collision or derailment.

We are now equipping a train for the Michigan Central and two trains for the Fitchburg, and hope soon to equip a train on the New York & New England. The estimated cost per car is $300, complete, ready for running.

The coupling is simple, and uncouples when lifted to a horizontal position. The joint is made with a rubber washer, and rubber hose is used. The actual working pressure is only about 3 lbs. per sq. in., so that the rubber does not decay. We have had no difficulty from freezing. Some condensed water will remain in the coupling when the train is left detached from the engine, but there is not enough ice to give trouble. The radiation is reduced to a minimum by means of an asbestos lining surrounding the metallic portion of the coupling. When the engine is attached to the train, steam will pass through the main pipe as fast as a man could walk, and the cars are soon heated to a comfortable temperature. The consumption of steam appears to be very small, as when running a train of 7 cars, with the temperature 10° below zero, the engineer could find no difference in the working of his engine.

Steam heating has many advantages, independent of safety, as compared with a stove. The economy in producing heat in one place—the locomotive fire-box—is obviously greater than where several fires are used, one or more on each car. The deteriorating effect of the ashes from car stoves on the upholstery is also entirely prevented, and the varnish is not injured by the excessive heat of a stove.

Mr. JAMES A. FAUST (Salt Lake City) exhibited a stove which he fired up, the flame showing pretty plainly at the end of the chimney. The stove was then upset and caused no damage except to the carpet, the appearance of which was irretrievably damaged by the stream of dirty water which escaped from the stove.

Mr. M. S. HANLEY then explained the Condon safety heater, which has been tried on the Flint & Pere Marquette. He uses a stove with a species of check or non-return valve in the base of the stack. This valve closes when the stove turns over, and the water in a reservoir under the stove extinguishes the fire.

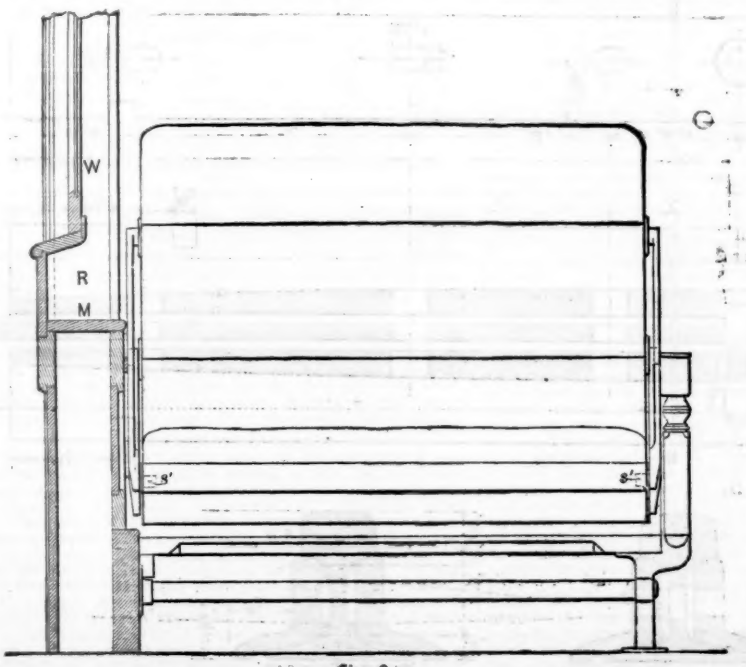


Fig. 2.

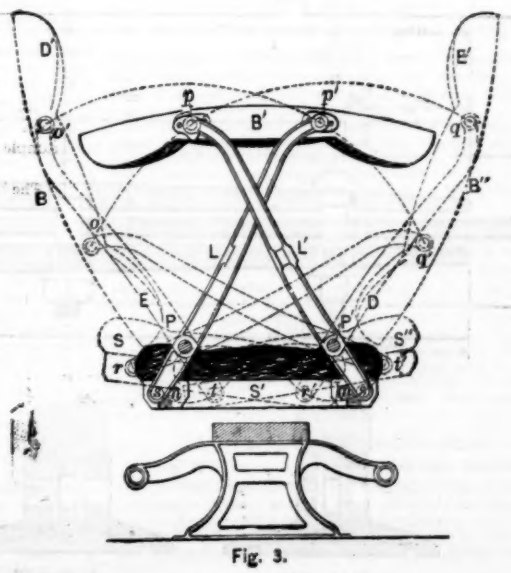


Fig. 3.

FORNEY'S IMPROVED CAR SEAT.

Mr. LAUDER (President of the New England Railroad Club) regretted that so few railroad men attended the meeting of the New York Club. He called attention to the danger of using stoves in the baggage, mail and express cars, which are placed in the most dangerous part of the train. He believed that in many cases the numerous objections against continuous heating could be overcome. It would, however, be almost impossible to adopt that system on a road like the Old Colony, with numerous junctions, where cars had very frequently to be cut out or attached. The most serious objection was, however, the difficulty of adopting generally one uniform system of coupling. That was a very important question, and he would urge the advocates of continuous heating to fix upon one universal coupling as soon as possible, so that cars heated by different systems might be run in one train.

The Baker heater set the cars on fire at the accident at Woodstock, Vt., so that that class of heater is not so perfectly safe as we imagined.

Mr. M. B. HURLEY (Quebec), explained his system of continuous heating. The pipes all couple and uncouple automatically and are protected by double air spaces.

Mr. PLASS (Standard Corporation of New York) explained a system of car heating he had lately patented. A stove is heated by air gas from the saturated solution of gasoline. An air pump is actuated by a spring motor, resembling the main-spring of a watch, and forces the air under pressure through the carbureter, which contains gasoline absorbed by sponges in boxes. The free liquor is drawn off after charging the generators, which are protected from the cold by wood and paper boxes. The system provides both for lighting and heating cars. The gas is burnt in burners, and also heats a boiler with a coil of steam pipe. Should the car leave the track, the gas supply is cut off from burners and stove by self-acting valves.

Mr. W. G. CREAMER did not believe the apparatus described by the previous speaker would sell. No railroad company would use such a dangerous article as gasoline.

Mr. PLASS stated, in reply, that the air gas was perfectly safe and that three or four thousand plants on this principle were in use in various houses, hotels, etc., in all parts of the world. He estimated that 50 cub. ft. of gas would run a Baker heater one hour, and that a car could be heated and lighted for three cents an hour.

Mr. RODERICK H. SMITH (Pennock Lighting and Heating Co): A primary battery is used for this system. The battery contains 100 cells, placed in a box underneath the car and weighing 1,000 lbs. The chemicals, carbon and zinc require renewing once every six months, and the liquid, the composition of which is a secret, required renewal every week. A battery of this size will provide ten lights of ten candle power each, at a cost of 70 cents per light per week; or say $7 per car per week. This system of lighting is being applied to cars on the Delaware & Hudson, Baltimore & Ohio and New York Central.

Mr. LAUDER stated that the Julien system, as used on one of the Boston & Albany cars, had 24 lights of sixteen candle-power each, the battery weighing 1,800 lbs. If so many lights were required, he feared that the amount of light proposed by the previous speaker, ten lights of 10 candle-power each, would be wholly insufficient.

Mr. MAYNARD briefly explained his system of heating.

Mr. RODERICK H. SMITH stated that the Martin system of heating cars by steam from the engine was now used on the Chicago, Milwaukee & St. Paul, the Cleveland, Columbus, Cincinnati & Indianapolis and the Dunkirk & Allegheny Valley. A train heated on this principle was also running on the New York Central, leaving the Grand Central Depot for Poughkeepsie at 2:30 p. m. He had made experiments and found that when the thermometer was at 26° the condensation on one car was 42½ lbs. per hour. When the thermometer was at zero the condensation was about 50 per cent. greater.

Mr. W. C. BAKER stated that his last form of heater, as illustrated in a recent issue of the *Railroad Gazette*, was perfectly safe, and, though smaller, had a considerably greater heating surface than any of his previous heaters.

Mr. B. BERNSTEIN explained Cline's Car Heater. It was stated that it contained a pan of fuel which would burn for 30 hours without attention.

Mr. E. L. GRIFFITH showed a model of a heater patented by Mr. Edward Henn, of Jersey City Heights. A patent fuel costing 2½ cents per lb. is used.

Mr. SMITH (Boston) showed a model of a cylindrical steel safety passenger car.

The hour being somewhat advanced, the Chairman announced that the meeting was adjourned, and that the consideration of the subject would be resumed at the next meeting, April 21.

A very handsome illuminated copy of the resolutions of condolence to the family of the deceased President of the Club, Leander Garey, was exhibited.

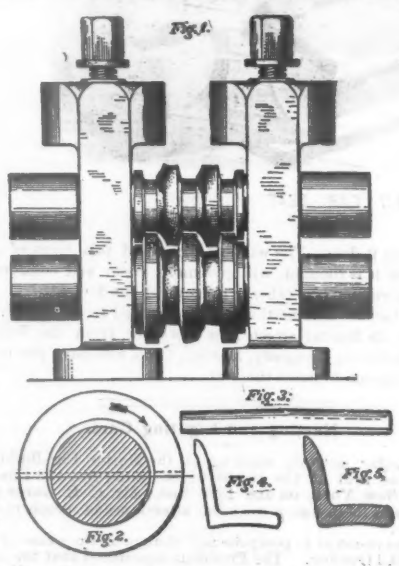
Rail Joint—Chicago, Milwaukee & St. Paul Standard.

The rail joint shown in the cuts is the standard adopted by the Chicago, Milwaukee & St. Paul Railway Co., Nov. 1, 1885. It was designed by Mr. J. T. Clark, General Superintendent, and "it is now (Feb. 19, 1887) in use on 1,000 miles of the track of this company, and has given such universal satisfaction that we shall continue to introduce it in our new work and on our old lines whenever rails require renewal."

It is a three-tie, supported joint, and, as shown here, is applied to a 67-pound rail. It will be noticed that the section of the angle-bar is increased in thickness from 0.597 in. at *G H* to 0.875 in. at *A B*. To roll it, special rolls were designed and patented by Mr. W. B. Parkes, of Bay View, Wis., which are described by the inventor thus:

"The tongues of the top roll are eccentric to the latter's line of axis, as best illustrated by fig. 2, the relative centres of both this roll and its tongues being respectively shown by the full line and the dotted line. The collars on the lower roll all have their centre on the line of axis of said roll. The irons to be treated by my improved rolls are first formed in the usual manner, and are of equal thickness throughout their entire length. These irons, after being suitably heated, are severally fed to the rolls, when the eccentric tongues of the top one are at their greatest throw, and the distance between them and the grooves on the lower one the least. The end of the iron first engaged is reduced by the pressure exerted and the surplus metal forced toward the other end. The pressure gradually diminishes as the throw of the eccentric tongues lessens until a half-revolution is accomplished, when, as the throw of said eccentric begins to increase, this pressure is correspondingly increased until the greatest throw is again attained and the iron passed out from the rolls. The operation just described leaves each iron thickest in its centre and gradually tapered therefrom toward each end, as shown by fig. 3, while the pressure faces of the rolls give said iron the desired countour, this result being accomplished at one revolution of the rolls.

"In the manufacture of fish-plates, I provide the eccentric tongues of the upper roll with a bevel that is also eccentric and opposes a bevel, and a shoulder on the collars of the lower roll. The blanks for the fish-plates are first given their angular shape by other rolls, but are of equal thickness throughout their length, and, when acted upon by my improved rolls, the bevel on the eccentric tongues opposing the beveled and shouldered portions of the collars act upon the upper bearing part of said plates, so as to give them the greatest width in the centre and a gradual taper therefrom to each end, fig. 5 showing this bearing part at its centre and fig. 4 at one end. Fig. 1 shows the eccentric tongues on the upper roll when at their least throw, and the space between them and the opposing grooves on the lower roll the greatest. In this figure I show the rolls constructed to operate upon two angle-irons at one time; but this construction may be varied so as to accommodate a greater number."



Eccentric Rolls for Angle Bars.

Locomotives Built by the Baldwin Locomotive Works.

The gradual growth in the size of locomotives can best be traced by examining the records of a large locomotive works showing the number and sizes of locomotives built each year. Statistics on this subject have already appeared in these columns. *

The following table shows the sizes and varieties of locomotives built by the Baldwin Locomotive Works for a series of years. The production for the last eleven years, 1876 to 1886, inclusive, is given for each year, and before that time it is given in detail for periods of years. The gradual increase in size can be clearly traced. It will be observed, for instance, that prior to 1870 the great majority of consolidation engines built had cylinders smaller than 20 in. by 24 in., whereas in 1881 and the following year only 35 engines had smaller cylinders, while no less than 180 had cylinders of what may be termed at present the standard size for this type of engine. Since 1882 no consolidation engines appear to have been built with cylinders smaller than 20 in. by 24 in., while a few engines have had larger cylinders.

The gradual increase in the size of American type engines is also very noticable. From 1870-1875 nearly half the total number of engines of this type had 16 in. cylinders, but in 1886 more engines were built with 16 in. cylinders than with any other size.

The table also shows the gradual decrease in the number of narrow gauge engines built, showing the effect of the almost universal adoption of the standard gauge.

The table shows clearly how the demand varied at different times for different classes of locomotives, and this is made more evident by a summarized table, No. II., which we have compiled and give below:

TABLE II.

RELATIVE NUMBER OF PRINCIPAL TYPES OF LOCOMOTIVES TO TOTAL PRODUCTION.

Baldwin Locomotive Works.

	Before 186.	1860 to 1869	1870 to 1875	1876 to 1880	1881 to 1886	Totals.
American engines, all sizes and gauges	366	487	743	659	789	3,044
Ten-wheeled engines, all sizes and gauges	220	259	271	81	241	1,072
Mogul engines, all sizes and gauges	18	20	178	203	568	987
Consolidation engines, all sizes and gauges	....	206	35	224	659	1,124
All other types, sizes and gauges	571	169	257	455	639	2,090
Total	1,175	1,141	1,484	1,622	2,896	8,318

It will be seen that the American type is still the favorite,

* Some particulars as to the gradual increase in the sizes of locomotives built by the Schenectady Locomotive Works were given in the *Railroad Gazette* of Dec. 24, 1886, page 891. Similar statistics were given as regards the Rogers Locomotive Works in the *Railroad Gazette* of Feb. 11, 1887, page 97.

CHICAGO, MILWAUKEE & ST. PAUL STANDARD RAIL-JOINT.

TABLE I.

THE SIZES AND TYPES BUILT FROM 1831 TO 1888.

Baldwin Locomotive Works.

TYPE OF LOCOMOTIVE.	Before 1860.	1860 to 1869	1870 to 1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	Total for years enumerated.
American pattern, narrow gauge, 12 inch cyls. and less	.....	.....	36	23	28	22	26	18	12	26	15	17	14	11	
" " " 13 " "	.....	.....	1	.....	2	2	2	5	.....	.....	2	2	1	6	
" " " 14 " "	.....	.....	.....	.....	.....	.....	1	8	1	2	3	3	1	2	
" " " 15 " "	.....	.....	.....	.....	.....	.....	.....	3	.....	2	.....	.....	3	2	
" " broad gauge, 13 " " and less	223	135	15	.....	2	2	.....	2	.....	1	2	1	.....	.....	
" " " 14 " "	27	21	69	3	1	3	2	4	3	.....	1	.....	1	2	
" " " 15 " "	41	99	135	8	2	6	9	10	2	1	.....	30	2	7	
" " " 16 " "	24	155	338	44	30	19	51	80	41	32	18	11	17	27	
" " " 17 " "	46	77	119	33	23	24	62	66	103	85	87	15	25	33	
" " " 18 " "	5	.....	24	3	4	4	18	4	10	15	26	12	5	34	
" " " 19 " "	.....	.....	6	.....	.....	.....	.....	.....	2	4	6	.....	.....	3	
"Ten-wheeled" pattern, narrow gauge	.....	.....	.....	.....	.....	1	3	.....	11	.....	10	7	2	4	
" " " broad " 15 inch cyls. and less	176	9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
" " " 16 " "	12	73	36	2	.....	.....	6	5	.....	4	10	.....	.....	3	
" " " 17 " "	.....	20	21	.....	.....	.....	1	.....	4	.....	2	2	.....	.....	
" " " 18 " "	3	157	182	14	.....	.....	7	24	20	19	10	15	.....	32	
" " " 19 " "	29	.....	32	.....	.....	.....	10	8	12	29	19	2	.....	24	
Mogul pattern, narrow gauge, 12 inch cyls. and less	.....	.....	45	1	1	18	15	9	2	3	6	4	8	2	
" " " 13 " "	14	.....	8	6	5	3	9	4	6	3	10	8	.....	1	
" " " 14 " "	.....	.....	.....	.....	2	1	.....	15	34	12	5	32	2	.....	
" " " 15 " "	.....	.....	5	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1	
" " " 16 " "	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5	
" " broad " 15 " " and less	.....	.....	3	.....	1	4	.....	.....	.....	1	.....	.....	.....	5	
" " " 16 " "	.....	3	23	.....	.....	3	1	.....	3	1	2	1	.....	10	
" " " 17 " "	.....	1	35	8	.....	4	5	2	2	7	18	2	12	16	
" " " 18 " "	.....	16	47	23	.....	2	7	14	31	41	38	28	14	22	
" " " 19 " "	.....	.....	12	.....	.....	40	.....	.....	.....	.....	.....	63	24	8	
Consolidation pattern, narrow gauge	.....	.....	10	4	8	6	26	55	65	50	47	12	11	3	
" " broad " cyls. less than 20 × 24 inches	.....	184	.....	.....	.....	.....	.....	.....	10	25	.....	.....	.....	.....	
" " " 20 × 24 inches	.....	22	25	21	8	4	17	73	79	101	108	79	6	55	
" " " 20 × 26 inches and larger	.....	.....	.....	.....	.....	.....	.....	2	.....	2	.....	2	1	3	
Four-driver switching engines, cyls. less than 13 inches	.....	24	91	20	41	64	31	32	19	27	25	24	38	31	
" " " " 13 inches and larger	92	43	73	5	2	2	15	22	17	18	19	9	6	19	
Four-driver and leading pony truck, cyls. less than 13 inches	.....	1	2	5	3	.....	1	.....	.....	1	4	.....	.....	4	
" " " " " " 13 inches and larger	.....	3	18	2	3	.....	3	.....	.....	1	1	3	3	2	
Four-driver and trailing pony truck, cyls. less than 13 inches	1	.....	.....	.....	.....	13	14	16	10	17	1	12	11	23	
" " " " " " 13 inches and larger	2	.....	.....	.....	.....	.....	.....	.....	2	1	.....	4	1	3	
Four-driver and trailing four-wheel truck, cyls. less than 13 inches	.....	.....	.....	.....	.....	23	4	4	26	14	.....	.....	2	.....	
" " " " " " 13 inches and larger	.....	.....	.....	.....	.....	1	31	.....	.....	.....	.....	1	1	.....	
Double enders, broad gauge	.....	.....	.....	.....	.....	.....	4	.....	2	1	.....	6	5	12	
" " narrow "	.....	.....	8	.....	1	2	.....	.....	4	1	1	1	7	5	
Six-wheeled switchers, broad gauge	17	77	10	3	10	9	12	28	6	10	42	11	6	38	
" " narrow "	.....	.....	49	2	5	8	3	1	11	6	18	5	4	9	
Special classes	131	21	6	2	3	2	2	1	5	.....	.....	5	9	9	
Various, less than 12 inches cylinders	278	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
	1,175	1,141	1,484	232	185	292	398	515	555	503	557	429	242	550	8,318

though the consolidation is rapidly gaining ground. The ten-wheeled type, after being preferred to the Mogul for many years, has been generally supplanted during the last ten years. A reference to Table I., will show that during the three years 1884-5-6 only 26 ten-wheeled engines were built with 19 in. cylinders, while no less than 169 Moguls of that size were turned out.

Table No. III. shows clearly which types of engines have been most generally built during the last few years. According to this table, out of every hundred engines built during that time, about 70 will be either of the American, the Consolidation or the Mogul type; about 14 will be either four or six-wheeled switchers; 8 will be ten-wheelers; and the remaining 8 will comprise all the other known types, four-wheeled, coupled with trailing pony truck, Forney type, etc.

TABLE III.

PROPORTION OF VARIOUS TYPES OF LOCOMOTIVES TO TOTAL PRODUCTION.

Baldwin Locomotive Works.

	1881 to 1886 inclusive. Number.	Per cent.
American	789	27.3
Ten-wheeled	241	8.3
Mogul	568	19.6
Consolidation	659	22.8
Four-driver switching	252	8 7
Four-driver and leading pony truck	19	0 7
" " " trailing " "	85	2.9
" " " " 4-wheeled truck (Forney)	44	1.5
Double-enders	45	1.5
Six wheel-d switchers	166	5.7
Special types	28	1.0
Total	2,896	100.0

President Adams on the Inter-state Commerce Law.

At the dinner of the Commercial Club in Boston, on the 19th inst, Mr. Charles Francis Adams, in a speech of much candor, told of the influences which resulted in the present law and of his personal relations to the subject, and presented his views of the probable and proper attitude of the companies toward the law. We give the conclusions of his address.

But leaving all this, and coming down to immediate questions connected with the Inter-state Commerce bill, there are three features of that bill which excite special comment. These are, first, what is known as the long and short haul; second, the prohibition of all rebates, drawbacks and secret arrangements with shippers; third, the prohibition of pooling.

LONG AND SHORT HAUL.

I think I may say that, as railroad commissioner, I was almost the father of what is known as the long and short haul clause. I have always maintained that the uncontrolled competition of railroads was a great evil. It had the necessary tendency of concentrating businesss at given points and in a few hands. The geographical point which did not have the advantage of railroad competition could not hold its own against the point which did have that advantage. So, also, the man who controlled a small business could not hold his own against the man who controlled a large business. The traffic of the large shipper would always be sought for on terms more advantageous than the smaller shipper could command. As a commissioner, I always maintained that this was wrong; as a railroad president I maintain that it is wrong to-day. Therefore, I am by no means prepared to admit that the Inter-state Commerce bill is likely to produce any serious or injurious results, when it says that no railroad company shall charge more for a longer haul than it does for a shorter haul, which is included in the longer haul under conditions substantially the same. I want to see this provision of the act brought into practical operation. I am not afraid of it. It is substantially just, and where a thing is substantially just it is right, and where it is right it should be law. But it is unnecessary to say that the whole question will come up for decision on the scope to be given to those five words, "under conditions substantially the same." In them there is much labor cut out for the commission, and they are big with litigation for the courts and fees for the lawyers.

REBATES, DRAWBACKS, ETC.

As respects the next debated provision, that prohibiting rebates, drawbacks and secret arrangements, I do not hesitate to put myself on record as saying that this is right, and should be law, and if it has not been law before, I am glad it is now. No one has suffered more than the railroads themselves from this system of rebates and drawbacks and secret arrangements. It has been a crying wrong. It should have been remedied years ago. It is well that it is about to be remedied now.

PASSES.

And as one phase of this question comes up the matter of free passes. As respects them I have long been on record. I hold that the free pass system on the railroads of this country is an outrageous abuse, and that the most radical remedy should be applied to it. I think if the most radical remedy were applied nothing but good would flow therefrom. How absurd it is that whole classes of persons should habitually travel for nothing, while others are compelled to pay. Neither would any human being find fault with a positive prohibition of the system of free transportation. Provided that every one knew that his neighbor paid as well as himself, none would find fault. I have, therefore, done the little I could to get the railroads to seize this great opportunity to get rid of an abuse the magnitude of which few people realize. Unfortunately, a loophole for escape is left open, and I fear that the railroads, unequal to the occasion, will avail themselves of it. The law applies only to travel between the states. Travel limited to any single state is not affected by it. It is in the power, therefore, of railroad corporations operating lines between states and territories to issue any number of passes they see fit, provided only that they read "good between points in such and such a state, or in such and such a territory." It is a mean and contemptible evasion. Nevertheless, it is a legal evasion, and I have small hope that the railroad companies will have the wisdom not to avail themselves of it.

POOLING.

Thus, so far as two of the three great features of this law is concerned. I have found little in it to criticise. I come now to the third feature—the prohibition of pooling. And in this respect the law seems to me to be radically bad. Why, gentlemen, what is railroad pooling? It is simply a check, and not a very effective one, which is put upon the great law of the survival of the fittest. Under the working of an unrestrained competition the weaker is systematically driven to the wall. When, in the case of railroads, the driving-to-the-wall process of destruction has been carried far enough, the weaker is absorbed by these methods with which we are so very familiar into the strong. The stronger assimilates the weaker; he makes it a part of himself; the lamb lies down inside of the lion. What is this but pooling in its final shape? That is, the pool here consists of all the parties united into one whole, and not now a weak whole, in which the law of competition has a certain effect, as under our pooling organizations, but in one consolidated, combined whole, subject to one law and freed entirely from competition. In inserting this anti-pooling clause, the framers of the Inter-state Commerce act have done the very thing which they meant not to do. Instead of insuring competition they insure consolidation. This is just as inevitable as fate—it was clearly pointed out to them—yet they could not take the fact in, and so they allowed a cant phrase to supply the place of common sense. So far as its prohibition of pooling is concerned, the act should have been entitled "An act to bring about the largest possible combination of railroads in the shortest possible time." With this view I do not think the railroad corporations at least should find fault. Whether the country itself is prepared to find itself face to face with the issue it is thus forcing prematurely on is entirely another question. But I think it will not be long before we shall have another illustration of the fact that, though the Legislature may propose, the laws of trade dispose.

Poughkeepsie Bridge.

The Secretary of War has written the following communication to Congressman Weber, relative to the proposed bridge across the Hudson at Poughkeepsie, N. Y.: "I beg to state that, so far as known by this department, no authority in United States law exists for the construction of this bridge, but it is understood the same is being erected under authority derived from the State of New York. In this connection your attention is invited to the opinion of the Attorney General of the United States, dated May 1, 1885, in the matter of the railroad bridge under construction across the Mississippi River at St. Paul by the Minnesota & Northwestern Railroad Co., from which the following is an extract: 'But as regards the rights of navigation, the public law of the United States appears to be a vindication of this right wholly to those who sustain injury thereto from unlawful obstructions, or otherwise, through the institution by them of the proper civil proceedings for relief.' It is proposed to add that this bridge is one of a number now erected or in process of erection which it is thought do or will interfere with navigation, and which were reported to the Senate on the 24th ult., in accordance with section 4 of the river and harbor act of August 5, 1886."

Dry Goods Merchants are Against the Classifications.

Representatives of the leading dry goods houses of New York and of several Western firms met at the Merchants' Club in New York this week and made the following resolutions in regard to the new freight classifications:

Resolved, That, in the opinion of this meeting, the proposed new classification is unjust and unreasonable; is contrary to the recommendations of the New York State Railroad Commissioners, who carefully weighed the whole subject, and is against the general welfare of all sections of the country.

Resolved, That the discriminating penalty of 50 per cent., embodied in the new proposed classification against the use of packing cases and in favor of canvas-covered bales, is an unreasonable and oppressive regulation, and cannot be sustained upon business principles, and it is in violation of the letter and spirit of the Inter-state commerce law.

Resolved, That a committee be appointed whose duty it shall be to prepare a suitable protest against the proposed against the proposed classification, and submit the same to the representatives of the railroads; and also, if necessary, to bring the matter before the Inter-state Commissioners; and to take any steps, which, in their judgment, may be necessary to secure their rights in the United States courts.

Resolved, That this meeting recommend shippers to pay freight based upon the new classification under protest.

The Whitner Automatic Brake Appliances.

The air brake bleeder and the frangible vent of the Whitner Automatic Brake Co. have been attached to a car of the Albany & Troy "belt line." These appliances were described in the *Railroad Gazette*, Feb. 25. We have no report of tests made, beyond the statement that the bleeder worked perfectly.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The interest of the approaching freight brake trials at Burlington will be greatly increased by the presence of brakes applied simultaneously throughout the train by the action of electricity. There is every probability that there will be a notable addition to the known types of electric brakes in which the current releases a pawl and the power to press the brake-shoes against the wheels is obtained from the axle by friction wheels or some analogous device. The new brake obtains simultaneous application by means of an electric current, while the power is obtained by compressed air. Such a brake has been previously proposed and has been tested on a few cars, but no sustained effort appears to have been made to ascertain the results in actual working or to effect those improvements in detail which are always necessary in a new invention. The forthcoming brake is, however, the fruit of considerable experience and has already been tested experimentally on a train of fifty cars.

It is unfortunate that New South Wales comes to our market for tenders for sixteen passenger and twenty-eight freight engines at a time when all of our locomotive works are full of orders and the English shops are not pressed with them. Up to the end of the fiscal year, June 30, 1886, we had sent 125 locomotives to Australia and New Zealand, but nearly all the orders have been obtained during slack times, as we cannot compete, in price, with England during our booms and her depressions, although the superiority of American locomotives is generally admitted.

Our exports of locomotives for the last 12 years have been:

Fiscal year, ending June 30.	No.	Value.
1875	79	$996,639
1876	44	561,559
1877	53	568,302
1878	98	1 016,974
1879	73	567,802
1880	60	466,313
1881	99	893 123
1882	133	1.455.717
1883	219	2,219,081
1884	282	2.819,946
1885	85	732,403
1886	52	333,399
	1.277	$12,631.252

It is claimed that, in addition to the above, locomotives have been exported to Mexico and Canada for which no returns have been made to the Bureau of Statistics.

The locomotives have been distributed about as follows: To Russia, 4 per cent.; England and all English colonies, 29 per cent.; Spain and Cuba. 10 per cent.; Mexico, 14 per cent.; South America, 37 per cent.

It is interesting to see the alacrity with which some statesmen are hastening to show to the world the fountains of their patriotism. The Ohio & Mississippi lately notified members of the Illinois House and Senate that conductors would not honor passes after April 1. A bill was introduced reducing maximum passenger rates from three to two cents a mile. A dispatch from Springfield says that "the calling in of 'annuals' will play havoc with railroad interests as far as the Legislature can play havoc. Nothing but passes and lots of them have held numerous law makers in line." Bill Nye thinks a man is a fool who will sit up nights and rob trains when he might go to Congress and get in his work on the surplus. An alternative even more practicable is to go to the State Legislature and "strike" a railroad.

We have never held that the salvation of the race depended upon the question of giving or not giving free passes (unless indeed they might be countersigned by St. Peter), but we have regarded it as an important minor evil, which would sooner or later be corrected, as the relations of the roads and the public were more justly settled. The practice cuts seriously into the revenues of the railroads, with no corresponding benefit to the public. In fact, the man who can least afford to pay his fare is the last man who can get a pass. On the contrary, he has to pay in increased fare his small share of the cost of carrying the richer man who travels free. But this is not by any means the worst of it. The greatest harm is in the insidious corruption of the minds of men in public life. Bribery by passes has been so delicate, so persistent and so common that few public men can have helped being more or less affected by it. A more robust morality will surely follow when the men who make or execute laws affecting railroads have to pay fare or walk.

A morning paper concludes from its study of the last great bridge disaster that "there is danger inseparable from railroad bridges built wholly or mainly of iron," saying that "the liability of iron to crystallize under the constant vibration of trains is a source of insecurity, etc." Unfortunately, our contemporary does not name any proper material. The inference intended is that iron and steel must be abandoned, or, at least, used but sparingly. The revolution contemplated is tremendous, and the mere suggestion of it must be sickening to those foolish and wicked men who have put their millions into iron and steel making plants. By the way, what shall we make rails of? Crystallization certainly is just as serious a matter, and just as sure to happen in rails as in bridges. We get a little comfort, however, from Mr. Metcalf's paper printed in the *Railroad Gazette* last week. He says:

If it be true that the largest crystals and the coarsest and weakest structure are formed when iron and steel are allowed to cool slowly and in a state of rest; and if the finest crystals and the best structure can only be formed by quick cooling and the violent agitation of hammer or of the rolls; or by careful heating to just the right temperature to cause the formation of fine crystals, it would seem somewhat anomalous to assume that this is all reversed in the cold state, and that cold iron and steel can be shaken up into coarse crystals and a weak condition. It may be possible that such an anomaly could exist, but it seems more reasonable to suppose when an axle or a crank-pin breaks and develops in the interior large, fiery and weak crystals, that those crystals were formed there by too much heat, too slow cooling, and too little work when the piece was formed.

One of the most eminent bridge builders in America says that crystallization is a "bugaboo." There is a great deal to be learned yet about iron and steel, but does any one know of an instance of the fall of an iron bridge that could not be accounted for without resorting to the occult and over-worked theory of the crystallization of iron under repeated vibrations or shocks?

The names of the Inter-state Commerce Commissioners are at last announced, and the President has been deliberate to good purpose. While the Commission is not an ideal one, it is much better than it seemed possible to get, considering the pay and duties of the position. The obvious criticism of the composition of the Commission is that there should have been on it at least one man of experience and weight as a practical railroad man. Without doubt some of the gentlemen named must have accepted the position from a sense of public duty rather than from ambition, or for the salary attached. For instance, the position of Commissioner, honorable and conspicuous as it is, can add little to Judge Cooley's distinction, while it will add much to his cares and involves a great loss in income.

Judge Cooley's knowledge of the relations of the railroads to the public and to each other is profound, and he is a man eminent as a jurist and of the highest character. His experience as Receiver of the Wabash system east of the Mississippi, although brief, must have been fruitful, to a man with his capacity for learning.

Col. Morrison's life has been so much in public view that it is hardly necessary to speak of it. Whatever may be his qualifications for this position, he is undoubtedly a man of integrity, courage and ability.

Judge Schoonmaker is a lawyer of high standing and a man of integrity and force. He has been Attorney General of the State of New York and has had much experience in railroad law.

Mr. Walker is also a lawyer of good position and absolute integrity. During his early years of practice in New York City, he attained a good position, and later in the Vermont courts he has earned more than a local reputation, although still a young man. He has given much time to railroad questions and secured the passage of the Vermont Railroad Commission bill.

Mr. Bragg was four years President of the Railroad Commission of Alabama, and showed diligence and tact in that difficult position. He formulated the rates for state traffic, and with great judgment persuaded the companies to adopt them.

In brief, the commission is not made up of broken-down politicians, or third-class railroad men, as has often been predicted would be the case; but it is a body of men of high and even eminent position, each of whom sacrifices something to take the office, and in whom the railroad companies and the country may properly feel much confidence. They are called on to undertake a task unique in our history; a task complicated and difficult in its nature and very uncertain in its results. We feel sure that they start with the cordial good will of every fair-minded citizen.

BRIDGE INSPECTION.

"Wise men learn by others' harms; fools scarcely by their own, as Poor Richard says."

The necessity for inspection of bridges which shall be something more than a formality is pretty obvious to a good many minds this week. With the public the question is how it shall be enforced. With railroad officials the question is rather what it should be; and both classes are interested in the problem of the machinery that can be, or should be, or is likely to be provided to secure it.

One solution is the appointment by the state of one or more inspectors, or giving power to state commissioners to inspect and condemn or approve bridge structures. The injection of officialdom in any form into the problem should be regarded only as an expedient to be avoided if possible. Any solution which hinges on legislation, the interference of the executive government, or the conferring of arbitrary powers on any man or set of men, is most objectionable. The interference of the state brings in politics, and we all know what that means. An official, appointed or elected, might be a skillful district leader, or he might have a political "pull," or he might have personal influence. Last of all, and far less likely than all, he might have special fitness for the place. The interference of the government in the private affairs of the citizen is only to be endured as the least of two evils. To put it in the power of one man, or of a group of men, to say to the railroad companies you may use a bridge of this design, but you shall not use that design, would be to arrest development in an art in which America to-day easily leads the world—an art in which the flexible and practical genius of our people has gained some of its greatest triumphs. A state commission, with powers to call for witnesses and papers in investigations, and to recommend legislative action, is a useful influence; but the railroads should be left the greatest liberty of choice, having before them always the possible action of the commissioners. This liberty is not only necessary for the best development of the art of bridge building, but to prevent any shifting of responsibility from the railroad officers to the officers of the state. This is a vital point.

How then is the inspector to be selected? How is the fittest man for any place found? By natural selection. Bridge inspection is no new thing. Men have earned their bread and butter by it for years, and with the usual result that all over the land are men who are known to be firm, upright and skillful in this particular business. It needs no governor or legislature to pick them out. Common repute has already done that. No railroad company is at a loss to find, when it wants to, a man to inspect its bridges, on whose judgment and fidelity it can thoroughly rely. The question whether the railroad companies shall select for themselves these specially qualified men, or whether they shall have politicians forced upon them; whether they shall protect their own property and the lives of their patrons in a business way, or whether they shall avoid the perils of quackery in other ways, depends largely on their own acts.

Many companies see this, but, unfortunately, many do not. In the nature of things, the public cannot know how much quiet inspection and rebuilding of bridges is going on all of the time; but one who enjoys to any degree the confidence of bridge engineers knows it. As a rule, indeed, the men who manage the railroads are fully alive to the requirements of the traffic of to-day, and, beyond a doubt, the vast majority of the railroad bridges of the country are well adapted for the work they have to do, or are likely to have to do for years to come.

Unfortunately it is true, on the other hand, that there are men in control of railroads who are afraid to know how bad their bridges are, or who do not appreciate what bridge inspection is. It is not very uncommon to see a man who knows that he is running in debt, but who has not the courage to look his trial balance in the face. Men of this irresolute stamp dodge the truth about their bridges from year to year, till it is forced upon them by some calamity. *We know that it has happened that a railroad president has tried to wheedle an honest and competent inspector into modifying an unfavorable report, and failing that, has pigeon-holed it until a bridge has fallen, causing loss of life, and damages enough to build half-a-dozen bridges.* The president's reason for not re-building the weak bridges was, of course, merely the cost. This was weakness—criminal weakness,—but it is one thing to be heroic in the easy seat of the critic, and quite another thing to satisfy the security holders of a railroad loaded with debt.

One need feel no relenting or mercy, however, for the responsible officer who is ignorant of the nature and need of adequate bridge inspection. He cannot be convinced too soon that it is not sufficient to hire an inspector, give him a locomotive and start him out on a time allowance of half an hour to a bridge. Adequate and proper bridge inspection begins at the beginning. No bridge should be accepted on faith, even from the best builders. It should be examined by a competent bridge engineer with large powers. All bridges should be examined at least once a year by an expert; and an expert must know not only the theory of the strains induced, but must be perfectly versed in the practical detail and construction of the parts, and in the characteristics of the material. The inspection should not stop at running a train over the bridge and noting the deflection, but a critical and minute examination should be made of every detail, as to its construction and its action in service. It should be known that each part is doing its duty, and can be kept in condition to do its duty. But it will not do to stop even here. Much more frequent examination should be made by a bridge watchman, trained by the expert in general conditions to be noted and in matters to be particularly watched in special cases.

But all that takes time, and usually pretty high priced time. One engineer of large experience in this special work finds that his *average* time is two days to a bridge, taking the bridges of a road right through, and including the runs between them.

It is for each railroad company to decide for itself whether or not it is best to take the bull by the horns, or to wait until an accident brings its train of lawsuits, damages, popular prejudice and ill-considered legislation. Meanwhile, it is a pity that the many who do the wise and courageous thing should have to suffer with those who dodge.

THE UNIFORM TRAIN RULES.

We print in this number some comments on the uniform code as reported and discussed at the Time Convention in New York City last October, and in connection therewith present portions of the code arranged in the manner several times advocated in these columns.

As our readers are aware, we have criticised the work of the committee chiefly in the matter of language and expression; and this is really no criticism, for the committee had a laborious task to sift and arrange the *substance*, without giving especial attention to the dress. They aimed simply to make their language clear and unambiguous, and succeeded admirably in doing so. Those rules which are most open to objection in themselves, regardless of the way in which they are worded, are chiefly concerning points on which the committee themselves were much perplexed, and their report and the discussion upon it show that important differences of opinion will very likely exist for many years yet. Indeed, the lack of uniformity on such a point as the time clearance necessary for trains of the same grade at meeting points—some superintendents being satisfied with one minute lee-way, or even less, while others firmly insist on five or more minutes—is really, in one sense, a grave drawback, and will be regarded by many as a serious detraction from the value of the code. If the convention is to be looked to by juries and coroners as a weighty authority, it will quite likely prove itself more or less of a disappointment to them, for they will doubtless conclude that disagreement on such vital features is evidence that the house is divided against itself, and so cannot stand. Uniformity of views as to the number of minutes a train should, under certain circumstances, wait for another; uniformity in telling brakemen how far to go when flagging, and other equally important points, are looked upon by outsiders as of prime importance; and it is not at all certain, by the way, that railroad men ought not to share the same opinion.

But language and expression can be treated as a separate question, and the difficulties that impede progress in the other side of the problem leave the way clear for more attention to be given to this. What little we do say should be said in the best way, however much is left unsaid.

The grounds for advocating more careful and detailed expression of train rules lie in the very nature of the case. Rules are to inform men what to do. The first object is to have the men understand precisely what the rules mean: the recipient should think the same thoughts that the giver thinks; the latter should therefore express his wishes (instructions) precisely and fully, and with a view to their easy comprehension by the one he is addressing. Where there are numerous topics to be crowded into one small head, care in arranging them becomes necessary. Water cannot be poured into a jug which is already full to the mouth; and even when there is considerable space within, the water must be poured so as to pass through the mouth of the jug in a cylindrical column if it is desired to get in the largest quantity in the least time. Similarly, a mass of principles and details that are as familiar as the alphabet to a superintendent, must, if he expects to make them equally familiar to an unintellectual freight conductor, be grouped in the most symmetrical manner possible; otherwise, time and strength will be wasted in the teaching process. A superintendent, in placing a man in a new position, desires to assure himself of the man's qualifications; one of the essentials to this is the questioning him on the rules; and unless the man be an exceptionally bright-minded one, most rules now in existence, including those in the new code, require considerable exegetical elaboration. The pupil has to read more or less "between the lines," and the teacher has to orally guide him in doing this. Now, why should not this inevitable duty of the instructor be marked out for him as fully as possible by being outlined in the code? On a large system the several division officers ought to act in unison on this subject, and simple interpretations incorporated in the code could be profitably substituted for the varying degrees of clearness and simplicity which are sure to characterize the individual interpretations that are now necessary. It is well to take pains to prepare rules for the least intelligent fresh candidates, for then they are sure to be all the more simple to the older men whose memories need to be refreshed on occasion.

Having, therefore, been asked to put our recommendations in concrete instead of abstract form, we offer no apology for their presentation, and trust that the managers and superintendents interested in the Time Convention will at least make known the chief criticisms they think them deserving of, whether the amount of worth discernible seems to be much or little.

LOCAL AND THROUGH TRAFFIC

We publish elsewhere a note from a correspondent with regard to the growth of through business on the railroads of the country, as discussed by Mr. Higginson in his article two weeks ago. We raised the question at that time whether the proportion of local traffic had become anything like as small as Mr. Higginson represented; and we are met with a demand for the facts in the case. They are, as our correspondent says, of the highest importance, and, like many other important facts, they are unusually hard to find out. The Iowa Commissioners have for the last two years made a vigorous attempt to do so. The results of this attempt were meagre and conflicting; the purport of the questions was generally misunderstood; and, for reasons which we shall discuss later, we feel disposed to question even the very guarded conclusions of the Iowa Commissioners themselves. When a body of men with the standing and influence of the Iowa Commission fails to elicit such information, it is a proof that the subject is a difficult one.

To begin with, how shall we define local freight? The best definition, perhaps, was that given by the United States census authorities, who included under the term all freight which did not pass over the lines of more than one company. Of course this gave room for much difference in various sections of the country, according to the extent to which railroad consolidation prevailed. Freight from the Missouri River to Toledo might be counted as local: while freight from New York to Providence, or even for much shorter distances, would be counted as through traffic. There was also some doubt as to what constituted a single company—whether, for instance, a consignment over a road by a line which it leased, but did not own, was local or through freight. But this form of question at least had the advantage of being one which the companies could answer. Their accounts showed perfectly well what freight had begun and ended on their own lines, and what had been received from or delivered to other companies keeping an independent account. They thus were able to make a return, such as it was, and the United States census figures are complete in their way.

On the other hand, the Iowa Commission defines local freight as freight which originates and ends within the limits of the state. Comparatively few companies can, without special arrangements which would often involve great expense, tell just how much of their freight is of this character. It is generally quite immaterial to them whether they deliver freight within or without the state as long as it remains on their own lines. The result is that the answers of the different companies are very incomplete, and sometimes obviously inaccurate. The Chicago & Northwestern made no return at all. The same thing was true of several other companies of less importance. Many of the roads made returns of such a character that they would appear to have charged a higher rate on through freight than on local. In fact, it is impossible to see how anything short of a revolution in the system of freight accounts could give even nominal completeness to such a table. As a basis for our figures we are compelled to start from the United States census returns.

The following is a summary of the figures given in the Tenth Census of the United States, Vol. IV., pp. 133-227.

PROPORTION OF THROUGH AND LOCAL FREIGHT, 1880.

CENSUS GROUP.	TONNAGE.		
	Local.	Through.	Total.
I. New England	10,700,000	14,300,000	25,000,000
II. Middle States (including Ohio and Indiana)	95,000,000	97,400,000	192,400,000
III. Southern States	8,700,000	7,200,000	15,900,000
IV. Illinois, Iowa, Wisconsin, Missouri and Minnesota	30,100,000	15,300,000	45,400,000
V. and VI. States and territories west of Mississippi and Missouri rivers	8,600,000	3,600,000	*12,200,000
Total	153,200,000	137,500,000	290,900,000

GROUP.	TON MILEAGE.		
	Local.	Through.	Total.
I	422,000,000	969,000,000	1,391,000,000
II	8,063,000,000	12,353,000,000	20,416,000,000
III	685,000,000	961,000,000	1,646,000,000
IV	3,908,000,000	3,052,000,000	6,960,000,000
V., VI	1,174,000,000	741,000,000	*1,936,000,000
Total	14,252,000,000	18,076,000,000	32,349,000,000

GROUP.	FREIGHT EARNINGS.		
	Local.	Through.	Total.*
I	$12,000,000	$12,400,000	$25,500,000
II	107,300,000	98,600,000	207,000,000
III	18,800,000	16,100,000	35,500,000
IV	60,800,000	33,400,000	94,700,000
V., VI.	33,800,000	18,300,000	52,400,000
Total	$233,700,000	$176,900,000	$4?6,100,000

* Including a small amount of unspecified freight, which produces a slight discrepancy.

NOTE: It should be observed that the real tonnage of through freight must have been less than half the nominal tonnage, because each ton must have been returned by at least two companies independently.

From this we see that the local freight furnished somewhat *less* than half the *ton mileage*, but somewhat *more* than half of the *tonnage* and *earnings*, and at least two-thirds of the real *tonnage;* probably three-quarters of it. This was the state of things in 1880. How far have matters changed subsequently?

Comparing the figures of the U. S. Census for 1880 with those of Poor's Manual we find the average *length of haul* for the different railroad companies to have been as follows:

	Miles.		Miles.
1880	111	1884	112
1882	109	1885	112½
1883	110		

These figures are obtained by dividing the ton-mile by the tonnage. They are only an approximation, and not a very near one, to the real average length of haul. If a ton of freight goes over two roads, it is reported twice. The divisor is thus made too large, and the average length of haul too small. Probably the true figure was something like fifty per cent. greater than the apparent one. But, however far from absolute truth, they have great value in showing the *comparate* conditions of the two years. The same causes which tended to make the result too small in 1880 tended to make it too small in 1885. To this statement there is one important exception, there was a consid-

erable amount of railroad consolidation within this period; and the effect of that would be to make the apparent length of haul nearer the true length than it otherwise would be. We should therefore expect the figures for 1885 to be a little larger than for 1880 on this account alone; because some tonnage is to-day counted once where five years ago it would have been counted twice.

No very great change in the proportion of through to local traffic can possibly take place without a decided change in the average length of haul reported by a railroad—that is to say, in the ratio of its ton-mileage to its tonnage. If, then, we find that the increase in this ratio from 1880 to 1885 has been trifling, we may infer that the change in the proportion of local freight has also been slight. However doubtful the individual figures may be, they shut out the extreme supposition that through freight contributes ninety or even seventy-five per cent. to the earnings of any considerable number of roads.

Now let us apply the same comparison to Iowa, and take a special case for illustration. The Rock Island furnishes a good instance, because the length of line controlled has remained so nearly the same for the last five years:

	Miles of road.	Tonnage.	Ton milage.	Average haul. Miles.
1879	1 125	2,736,000	510,900,000	229
1880	1,237	2 967,000	686,500 000	231
1881	1,335	3.376,000	712,400.000	211
1882	1.365	3,755.000	788,500.000	210
1883	1.381	3,455,000	701,600 000	203
1884	1,384	3 618 000	734,600,000	203
1885	1,384	3,981.000	780,900,000	196

Here we see a decided *decrease* in the average length of haul, totally inconsistent with the idea that the local traffic is gradually being killed, or diminishing in importance.

How, then, do the Iowa Commissioners—a most excellent authority—come to make the statement on page 20 of the Report for 1886, that the proportion of local freight does not exceed twenty-five per cent. of the whole? In the absence of anything like complete returns, we are unable to say. But the figures which they give by no means warrant the conclusion. Of the roads which make any report at all on the subject—and this list includes the Rock Island, the St. Paul & Omaha, the Milwaukee & St. Paul, the Chicago, Burlington & Quincy, and the Wabash—the tonnage of local freight carried is decidedly greater than the tonnage of through freight, forming nearly three-fifths of the whole; and though the proportion of ton-mileage would of course show a larger proportion for the through freight, there is every reason to believe that the ratio of through and local earnings would be much closer to that of the tonnage than to that of the ton-mileage. An examination of the returns of the Rock Island and one or two other roads confirms us strongly in this belief. If that is the case, the Iowa returns, as far as they go, really confirm the conclusions of the United States Census.

It is possible that the commissioners have reached their conclusions by comparing the total tonnage of the roads reporting with the Iowa tonnage reported by the same roads (Rep. 1886, pp. 84, 85). If they have done this, they have made a mistake. They have in that case not compared the Iowa local traffic with the Iowa through traffic alone, but have been comparing the Iowa traffic of the companies with their total traffic, through and local, in every other state into which their lines run. Of course the latter is enormously greater than the former.

It is altogether probable that the ton mileage of through freight, as defined by the Iowa Commissioners, exceeds that of local freight; but there is no evidence that the same thing is true either of the tonnage or of the earnings in through and local freights respectively. And if it is not true in Iowa, it is still less likely to be true in most other sections of the country.

Those who charge that our railroads are destroying their local business, will find it hard to make the statistics bear out their assertions.

FREIGHT CAR TRUCKS.

Our correspondent who writes from China advocates many important improvements in freight car trucks. A longer wheel base, independent semi-elliptical springs to each journal box and larger wheels are all features which would make the car easier on the track, but would considerably increase the cost of the truck. It is an open question whether the advantages to be gained are worth the extra cost. The diamond truck is very cheap and simple, and has therefore almost entirely superseded all other forms of trucks for freight service, though it has many serious defects, and is undoubtedly very hard on the track. A modern 60,000-lb. car weighs nearly 30,000 lbs., and thus a loaded car has a weight of nearly 45,000 lbs. concentrated on a wheel base only 5 ft. long. The strain on a weak splice bar or on the rail when the centre of the wheel base is above a rotten tie must be often fully as severe as that caused by a driving wheel of a locomotive of ordinary weight.

The driving wheel is a very close approach to a true circle, the wheels are the largest on the train, and the springs and equalizing gear are efficient and carefully looked after. The freight car wheel is always small, often has flat spots and always wretched spring gear. There can consequently be little question as to which inflicts the most damage, especially at any considerable speed.

The demand for cars of increased capacity was for some time met by the unaided efforts of the paint brush. But though it was an easy and simple matter to erase the figures 30,000 and substitute 40,000, the method had its disadvantages. Broken axles sometimes involved serious wrecks, and in some cases the paint brush had to be again invoked on the other side of the question, and 50,000-lb. cars were marked down to 40,000 lbs. capacity until new and stronger axles were provided.

Many of the 60,000-lb. cars lately introduced have proved unable to carry this enormous load, and broken bolsters and sills show that the strength and consequently the weight of these cars will have to be still further increased. Any large increase of weight should undoubtedly be accompanied by an increased truck wheel-base. But a longer truck implies a heavier truck, and as usual with rolling stock, an increase in the strength of one part involves an increase in the strength and weight of many other parts.

Another aspect of the case deserves consideration. Within a few years continuous brakes will undoubtedly be largely used on freight trains. When a freight engineer can control the speed of his train with a touch of a handle he will undoubtedly often run at the speed of a passenger train, and as a higher speed will be found to save time and confer many other advantages, a demand will arise for freight cars suitable for running at high speeds.

Some modifications in the present style of freight car construction will then be undoubtedly necessary. The body of a car has to carry the load; protect it from the weather, and stand the shocks in switching. It is evident that neither of these functions is much influenced by the speed at which the train is run. The truck, however, is largely affected by the speed. Journals which run cool at 15 miles per hour will heat at double that speed, and springs that are simply rigid and harsh at a slow speed, cause a positively dangerous jump when the train is running fast. Some material modifications of the diamond truck may therefore be inevitable if the adoption of higher speeds on freight trains is found advisable.

Car Seats.

It is a somewhat singular fact that while nearly every detail of passenger cars has been greatly improved during the last few years, few efforts have been made to render car seats better adapted to their purpose. It is obvious that if the seat itself is uncomfortable, the traveler will find a railroad journey very wearisome despite the solid construction and elaborate ornamental finish of the car. As the cost of comfortable seats is very small in comparison with the large sums spent upon other parts of the car, it is somewhat surprising that more attention has not been devoted to this obvious, cheap and easy method of rendering travel less fatiguing. It is, however, still too common to find palatial cars on which thousands have been spent on frescoes, inlaid carving and the latest form of the Queen Anne craze, while such elementary matters as coat hooks, arm and foot rests, parcel racks, etc., are entirely neglected as being beneath notice. Yet few travelers appreciate the beauties of a ceiling mainly composed of large round-headed brass nails, while the great majority would be glad of a smoking-room in which they could hang up hats and overcoats and stow away hand baggage. A large amount of solid comfort could be cheaply secured by a little attention to these small things.

The improved car seat illustrated in the present issue is a distinct movement in the direction of greater comfort and is apparently gained at a very small addition to the total cost of a car. This seat appears to have been received with great favor by both passengers and railroad men. In the spring of 1886 the New York Central equipped four new cars with the improved car-seats patented by Mr. M. N. Forney. These cars were put in service on a train which runs between Poughkeepsie and New York, on which many passengers make daily journeys. In order to ascertain how the seats were liked, descriptive pamphlets and postal cards were inclosed in envelopes, and placed on each seat on one occasion before the train left Poughkeepsie in the morning, and on another before it left New York in the afternoon. Passengers were requested to write their opinion of the seats on the postal cards and mail them to Mr. Forney. Fifty-four opinions were received, and of these 52 were favorable and only the remaining two were unfavorable. One of the latter replies complained of the seat as "too low; the back higher than necessary; the depression in the seat uncomfortable; the heavy plush hot and stuffy. Is it not possible to use a lighter and cooler covering?" The other found the foot rests "abominable." We understand that the foot-rests have since been altered. It would therefore appear that out of 54 persons who expressed their opinions, only one objected to the *form* of the seat. This is pretty conclusive evidence that the shape of the seat is a great improvement. Many travelers expressed themselves very warmly on this point.

Five persons, however, stated that they found plush too warm in the summer, and asked if some other material could not be substituted, cane being suggested. These seats fit the body more closely, and would therefore be warmer than those of ordinary construction, but the proper way to remedy this defect is to employ a cooler material than plush for summer use. This is done in nearly all European countries, just as the plush seats of parlor car chairs are covered with a cool cotton or linen cover in hot weather. Plush collects dust, which cannot be easily swept off, and is for this reason alone very unsuitable for summer use. The present seats are so badly shaped that a person always tends to slip off, and as plush has a peculiar surface which offers great resistance to slipping, it is the only possible material which can be used with the present style of seat. If smooth leather or any other similar material were used, a journey would be simply intolerable; but with a well-formed seat, properly upholstered and stuffed with plenty of horse hair, leather and many other cool and smooth materials, form a very cool and comfortable seat covering.

Open canework backs and seats are largely used in South America, India, Italy, the South of France and other hot and dusty countries. This forms a very cool and clean seat, as no dust can lodge. It is, moreover, very cheap, as neither springs nor stuffing are required.

When once the proper contour of seat is obtained, the choice of a large number of coverings becomes possible, and it would certainly be desirable that railroads should bear this in mind, for in many respects plush is by no means the ideal material for covering car seats. The main thing, however, is to make the seat conform to the shape of the human body, so that, as an engineer would say, "the bearing surface is ample," and a doctor would add, "the muscles are relaxed."

Giving Notice of Irregular Trains.

The report of the committee on uniform rules at the last General Time Convention contained a note stating that a satisfactory signal for the front of an engine other than red, green, or white was unattainable, and that therefore the committee could not recommend anything for a signal indicating that trackmen and others might soon expect a train without rights. This is the least important of indicator-signals, and if any must be omitted this is undoubtedly the one: but a great many superintendents will wish to have some device to fill this place, and it will be well if those having wisdom on this point and who are really desirous of making the uniform code as useful and successful as possible, will come to the spring convention prepared to talk intelligently on the question. Uniformity must not be given up because first attempts fail, and superintendents should not contentedly sit down and allow old or inconsistent methods to be continued simply because a reform costs time and thought, or because the committee have not dropped it ready-made into their laps. If some signal, only partially satisfactory, is the best attainable, and if a large share of the roads insist on retaining some kind of a signal for indicating irregular trains, the facts ought to be brought before the convention. If superintendents are going to continue using what they now have, for lack of something better, they should at least tell their brethren about it.

What will be the practical effect among track repairers on a *small* road where this signal is abolished?

The Philadelphia & Reading Report.

The report of the Philadelphia & Reading Railroad Co., together with that of the Philadelphia & Reading Coal and Iron Co. and the operations of the Receivers for the fiscal year ended Nov. 30, 1886, is especially interesting at the present time, in view of the pending plan of reorganization,

preceded by a new management of acknowledged ability, from whom, however, neither stock nor bondholders should expect impossibilities. Nor should they indulge in the illusions of hope, but face the facts and sanction drastic measures toward this overburdened property.

The most important questions, therefore, for consideration are: What constitutes this great property? What are its assets and liabilities? What is its earning capacity?

The following shows the miles of road and track owned, leased and controlled:

	Single track.	Double track.	Length of road.	Sidings and laterals.	Total length of track.
Owned	170.0	157.0	327.0	330.4	814.4
Leased	774.0	378.4	1,152.4	617.0	2,147.8
Controlled	106.6	.....	106.6	30.5	137.1
Total	1,050.6	535.4	1,586.0	977.9	3,099.3

As the cost of the road is stated in the balance sheet at $27,359,976, the cost per mile of road exclusive of depots is $83,669, and per mile of track $33,612.

The equipment of the company in service at the close of the year (all four wheel cars being reduced to eight wheel) was: 943 locomotives, 976 passenger and baggage cars, 38,627 coal and freight, 864 company's service cars.

These are represented on the balance sheet in the following items:

Locomotives and cars		$10,398,057
" " " in car trust		3,427,861
New equipment in car trust		226,418
Total		$14,052,336

General account, condensed:

Liabilities.

Common stock	$38,537,461.78	
Preferred stock	746,500.00	
		39,283,961.78
Mortgages on road, including income, mortgage loan 1876-96		71,681,591.13
Mortgages on real estate		2,098,200.60
Convertible adjustment scrip, 1883-88		2,110,730.00
Car trust certificates		2,222,000.00
Debenture loans		6,856,100.00
" scrip		557,569.10
Loans Schuylkill Nav. Co. and East Penn. R. R.		3,074,150.00
Deferred income bonds		7,670,427.09
		$135,524,729.70
Floating debt, consisting of bills payable, loans and receivers' certificates		9,560,175.55
Current liabilities, consisting of amounts due leased lines, unpaid interest and dividends, wages, due other roads, and taxes		16,741,182.05
Insurance and sinking funds and miscellaneous		2,057,478.22
		$163,883,865.52

Pennsylvania & Reading Coal and Iron Co. profit and loss account ($4,115,120.90) omitted, as it is not a direct liability.

Assets.

Roadbed and tracks	$27,359,976.48
Depots	4,773,202.64
Locomotives and cars	14,052,336.67
Real estate	8,207,108.14
Stock in sundry lines	1,883,036.13
Stock in P. & R. Coal and Iron Co.	8,000,000.00
Bonds and mortgages P. & R. Coal and Iron Co.	39,737,965.53
Colliers and barges	2,809,899.05
Works and franchise Schuylkill Nav. Co	1,000,000.00
New equipment, tracks, depots, etc., other than above	699,191.40
Cash, bills receivable and freight bills	1,755,316.87
Stock and bonds other than above mentioned	12,924,617.85
Materials on hand	1,363,807.88
Due by leased lines for new work	1,717,627.92
Due by leased and controlled lines on account of advances, etc	3,644,193.92
Due by connecting roads and on current account	1,014,845.08
Sundry debits	429,403.31
Due by P. & R. Coal and Iron Co.	19,281,395.24
Total	$150,605,924.01
Loss, representing a reduction in capital	12,277,941.51
	$163,883,865.52

This loss is covered by the expenses and discount on bonds, loss on Central Railroad Co. of New Jersey stock and losses in operation of the road.

Condensed balance sheet Philadelphia & Reading Coal and Iron Co.:

Liabilities.

Purchase money mortgage bonds	$12,261,000.00
Bonds and mortgages on real estate, etc	769,837.45
Bonds and mortgages held by P. & R. R. R. Co	39,737,965.53
Debenture bonds, 1872-92	1,117,000.00
Capital stock	8,000,000.00
Bills receivable, Receivers' certificates, etc	1,855,362.80
Current debts, wages, etc	1,622,252.98
Due Philadelphia & Reading on lease account	19,275,778.11
Total	$84,639,196.87

Assets.

Property accounts, including coal and iron ore lands and improvements	$62,847,653.94
Stocks and bonds owned	5,725,928.85
Cash on hand, bills receivable, open accounts, etc.	1,292,914.95
Loans to other companies and individuals and sundry accounts	830,762.92
Stock and bonds other than above, supplies and materials, and iron ore and coal on hand	1,684,367.35
	$72,381,628.01
Liabilities more than assets, representing the impairment of capital	12,257,568.86
	$84,639,196.87

The loss shown on the coal and iron balance sheet was caused by its earnings being too small to pay interest and expenses.

Taking everything in the assets as being stated at its actual worth, this loss of $12,257,568.86 wipes out the capital stock of 8,000,000 and renders this company unable to pay $4,257,586.86 of unsecured indebtedness. It goes without saying, if the assets were stated at their actual value, this loss would be much greater.

If we now turn to the general account of the Philadelphia & Reading Railroad Co., we find its impairment of capital amounts to $13,277,941.51, but in arriving at this result $8,000,000, capital stock of the Coal and Iron Co., and $19,281,395.24 due by the latter were considered as valid assets, while it has been shown above that this capital is lost and $4,257,568.86 of the latter cannot be paid, so that these two amounts must be added to the loss on the railroad's general account; or, in other words, the loss on the Coal and Iron Co.'s account must be added to that of the railroad, whereby it is swelled to $25,535,510.37, which represents under the most favorable view of the case the extent that the capital stock of this railroad company has been impaired.

This is not all, however, for it may be justly said that the amount advanced to leased lines, $1,717,627.92 for new work, and $3,644,193.92 for general purposes, is of little real value; and that the stocks and bonds of the Coal and Railroad Co., of outside companies, and the roadbed and track, depots, equipment and real estate are stated at cost, and would, if appraised at their real value, be much less. Thus is presented a truly deplorable state of affairs—an impairment of capital unprecedented in a corporation of such magnitude, which will tax the ablest management practicing the greatest economy to overcome.

It must always be kept in view that liabilities are tangible things and must be paid, while assets are much diminished in realizing, and no greater error can be fallen into by the public than considering assets on the balance sheet at the figures stated.

It is also well to note that the deferred income bonds are stated at their issue price, while their nominal par value is $25,568,090.30.

The business of the year compared with 1885 is as follows:

	1886.	1885.	Differences.	P. c.
From passengers	$5,607,109.01	$5,286,284.09	Inc. $320,824.92	6.1
Mchd'se freight	8,934,255.47	7,622,867.18	Inc. 1,331,388.79	7.5
Coal freight	13,150,298.64	13,248,788.76	Dec. 189,490.12	1.4
U. S. Mails	76,802.67	82,938.19	Inc. 3,864.48	4.6
Miscellaneous	1,017,516.62	1,002,187.31	Inc. 15,329.31	1.5
Total	$28,824,982.91	$27,343,065.53	Inc. $1,481,917.38	5.4
Exp. exced. rents and int	16,450,337.65	15,426,540.69	Inc. 1,029,796.96	6.7
Net earn'gs from operation road	12,374,645.26	11,922,524.84	Inc. 452,120.42	3.8
Receipts from other sources	796,717.85	729,734.40	Inc. 68,983.45	9.5
Total	$13,173,363.11	$12,652,249.24	Inc. 521,113.87	4.1
Rents & interest	15,804,594.84	16,184,452.84	Dec. 379,858.00	2.3
Deficit	$2,631,231.73	$3,532,203.60	$900,971.87	25.5

The total earnings of the Coal and Iron Co. for the year were $15,846,411.70, and the expenses were $16,993,465.66, leaving a loss on operation of $1,147,053.96, as against a loss in the preceding year of $124,689.85, a very discouraging showing.

Ton-miles of coal were 1,413,582,953, being an increase of 104,699,674 tons, or 8 per cent., and of merchandise freight were 622,838,328 tons, an increase of 85,976,545 tons, or 16 per cent.

The passenger miles were 313,486,552, an increase of 21,341,074, or 7.3 per cent.

The difference between the increase in passenger earnings of $320,824.92 or 6.1 per cent., and 7.3 per cent. increase in the movement, is accounted for by a slight decrease in the rate, which was per passenger per mile in 1885 1.843 cents, and in 1886 1.821 cents.

The increase in merchandise freight of $1,331,388.79, or 17.5 per cent., as against an increased movement of 16 per cent., is accounted for by an increase in the rate, which in 1885 was per net ton per mile 1.502 cents, and in 1886 1.515 cents.

The decrease in coal freight earnings of $189,490.12 or 1.4 per cent., notwithstanding an increase on the ton-miles of 8 per cent., was covered by the large decrease in the rate, that for 1885 being 1.072 cents per gross ton per mile, while that for 1886 was .978 cents.

The increase in the total earnings from railroad traffic was 5.4 per cent., but the increase in expenses was 6.7 per cent.

The disproportion of the latter to the former is accounted for by the increase in the volume of the whole traffic, while the rate on both coal and passengers decreased, and by an increase in the rates of wages of many of the employés.

The rents and interest decreased 2.3 per cent. and the deficit on the operations of the year from $3,532,203.60 to $2,631,231.73, a decrease of $900,971.87, or 25.5 per cent.

The deficit on the operations of the New Jersey Central was $1,270,085.74, which, deducted from the whole deficit, leaves $1,361,145.99 to cover that on Philadelphia & Reading, and since the Central is now in charge of its own stockholders the Reading will be relieved of the loss caused by operating it from Jan. 1 to Nov. 30, 1887, of the current fiscal year.

The earnings per mile of road are $18,175; expenses, $10,372; profit, $7,803.

This is an excellent showing, and taken in connection with the good rates which have prevailed, viz.: .978 cents per gross ton per mile on coal, or .873 cents per net ton, and 1.575 cents per net ton per mile on merchandise freight, and considering the vast traffic involved, places the road's earning capacity beyond question, provided rates can be maintained.

So that with a proper attention to economy in operation and a reduction in rental and interest charges there is a probability that in a few years its losses may be overcome.

Provision Exports in February.

The exports of pork products in February were 73,409,417 pounds. This is about 16 per cent. less than the exports of the previous month. They were, however, about 6½ per cent. greater than last year. For ten years the exports of pork products in February have been, in *millions* of pounds:

1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.
138.6	129.5	100.4	140.0	72.2	68.2	45.3	64.4	99.0	73.4

While the exports this year are greater than those of the same month of any other year since 1881, they are only about one-half as great as in 1881, and very much less than the February exports of the three previous years. In 1877, the February exports were only 54.6 millions pounds, or about 29 per cent. less than last month.

The exports of fresh beef in February were 6.1 millions lbs., a decrease of about 7 per cent. from last year's exports, which were very much smaller than the exports in February 1885. There was an increase of 14 per cent. in the salt beef exports last month, as compared with the exports of same month last year, and an increase of 46 per cent. in the exports of tallow.

Expressed in values, the exports of beef and pork products for the four months ending with February, have been as follows:

Beef products:	1886-87.	1885-86.	Inc. or Dec.	P. c.
Canned	$1,487,914	$1,092,969	I. $394,945	36.1
Fresh	2,420,321	2,961,262	D. 540,941	18.3
Salted	769,040	849,335	D. 80,295	9.4
Tallow	936,643	539,507	I. 397,136	73.6
Total	$5,613,918	$5,443,073	I. $170,845	3.1
Pork Products:				
Bacon	$11,611,332	$10,907,277	I. $704,055	6.5
Ham	2,405,210	1,659,477	I. 745,733	44.9
Pork	1,788,956	1,727,476	I. 61,480	3.6
Lard	9,130,082	6,560,854	I. 2,569,228	39.1
Total	$24,935,580	$20,855,084	I. $4,080,496	19.6

The following shows the value of the exports of beef and pork products from each port in February, and also for the four months ended with February:

	February 1887. Value.	Per cent.	February 1886. Value.	Per cent.
New York	$3,964,518	55.8	$4,007,170	66.5
Boston	1,584,244	22.3	853,725	13.5
Philadelphia	590,101	8.3	514,950	8.4
Baltimore	585,190	8.2	429,311	7.0
New Orleans	174,846	2.5	14,615	0.2
San Francisco	20,285	0.3	13,045	0.2
Portland	139,520	1.9	183,986	3.0
Other ports	50,239	0.7	72,942	1.2
Total	$7,108,943	100.0	$6,159,644	100.0

	For the four months. 1886-87. Value.	Per cent.	1885-86. Value.	Per cent.
New York	$18,802,378	61.7	$17,536,477	66.7
Boston	6,402,171	21.0	3,655,905	13.9
Philadelphia	1,822,349	6.0	2,367,666	8.6
Baltimore	2,232,112	7.3	1,518,605	5.8
New Orleans	297,853	1.0	44,044	0.2
San Francisco	90,682	0.3	85,113	0.3
Portland	423,345	1.4	701,077	2.7
Other ports	418,608	1.3	490,270	1.8
Total	$30,549,498	100.0	$26,298,157	100.0

While the value of the exports for the four months of this year was 16 per cent. greater than the value of the exports for the same period last year, the various seaports do not appear to have shared equally in the increase, in fact there was a decrease in the value of the exports of Philadelphia and Portland.

The increase and decrease in percentages for the four months this year over the same period of the previous year was:

	Increase. Per cent.	Decrease. Per cent.
New York		5.0
Boston	7.1	
Philadelphia		2.6
Baltimore	1.5	
New Orleans	0.8	
San Francisco		
Portland		1.3
Other ports		0.5
Total	9.4	9.4

The increase in the exports this year was mainly caused by the very large exports of lard. The value of the lard exports for the four months ending with February of this year amounted to $9,130,082, as against $6,560,854 for the same period of the previous year. There was also an increase of over $700,000 in the value of the bacon exports.

The value of the exports of dairy products (butter and cheese) in February was only $265,483, being a decrease of 45 per cent. as compared with the exports in February, 1885.

The through freight shipments, other than live stock, from Chicago, destined to trunk line termini and east thereof, in February, were 162,975 tons. This does not include shipments via the Chicago & Atlantic. Including the through shipments of that road, the total through tonnage from Chicago last month probably aggregated about 185,000 tons.

The February shipments for the last nine years have been, in tons:

Year.	Tons.	Year.	Tons.
1879	198,541	1884	195,789
1880	169,181	1885	259,371
1881	207,790	1886	217,030
1882	225,815	1887	185,000
1883	234,232		

Thus the shipments last month were about 15 per cent. smaller than those of February, 1886, and were smaller than those of the same month of any year since 1880.

For the two months ending with February, the through shipments of dead freight from Chicago have been, in tons:

Year.	Tons.	Year.	Tons.
1879	390,053	1884	430,493
1880	334,675	1885	581,444
1881	475,433	1886	384,695
1882	546,263	1887	385,000
1883	505,394		

The two months' business was about the same as last year; but was smaller than the business of the corresponding two months of any year since 1880.

Seaboard Receipts of Flour and Grain in February.

The receipts of flour and grain at the four Atlantic ports in February were 13,765,247 bushels, as against 14,110,621 in January.

The February receipts of the four ports for the last five years have been:

	New York. Bushels.	P.c.	Boston. Bushels	P.c.	Philadelphia. Bushels.	P.c.	Baltimore. Bushels.	P.c.	Total. Bushels.
1883	4,624,051	49.1	1,741,746	18.2	1,723,750	18.7	1,296,457	30.0	10,389,004
1884	4,440,558	46.2	2,815,644	27.0	1,367,150	12.1	1,413,286	14.7	9,636,648
1885	7,335,810	46.7	1,909,121	12.3	2,176,015	13.8	4,275,221	7.2	15,716,167
1886	9,668,468	59.8	2,421,950	15.1	2,116,958	7.4	2,040,450	17.7	16,087,830
1887	5,860,300	42.6	2,641,774	19.2	1,863,731	13.2	3,579,442	26.0	13,765,247

The total receipts at the four ports last month was smaller than the February receipts in 1885 and 1886, but much more than the receipts in corresponding month in either of the two previous years. New York's percentage (42.6) of the total receipts last month was less than its percentage for the same month of either of the previous years, except 1883.

The following statement shows the flour and grain receipts at New York during February, also a comparison with the receipts in the previous month:

	February. Bushels.	January. Bushels.		Inc. or Dec. Bushels.	P. c.
N. Y. Central	1,884,217	2,157,930	—	273,713	12.7
Erie	1,310,346	1,721,532	—	411,187	23.9
Pennsylvania	567,934	540,915	+	27,019	4.9
Lackawanna	455,282	626,389	—	171,107	27.3
West Shore	547,207	958,805	—	411,598	42.9
Various	980,582	845,030	+	144,552	17.1
Total rail	5,754,568	6,850,601	—	1,096,033	16 0
Coastwise	105,732	75,792	+	29,940	39.5
Total	5,860,300	6,926,393	—	1,066,093	15.4

While the receipts in February were 16 per cent. less than the January receipts, the decrease does not appear to be uniform in the receipts of the various roads. Forty per cent. of the decrease seems to have been in the receipts of the West Shore. That road, however, has carried during the last few months an unusual proportion of the total rail receipts. In January, it carried 14 per cent.; in December, 25.6 per cent. in November, 19.4. Last month it carried between 9 and 10 per cent. The Pennsylvania carried about 5 per cent. more grain in February than it did in January, but its percentage of the total rail receipts is only about 10 per cent.

The receipts by "various" roads was about 17 per cent. larger in February than in the previous month; this increase is probably mostly in the receipts of the Lehigh Valley, the receipts of which was about 15 or 16 per cent. of the total rail receipts for the month.

The total receipts of flour and grain at New York during February for the last six years have been as follows, in bushels:

1882.	1883	1884.	1885.	1886.	1887.
6,446,798	6,926,337	4,380,070	7,335,810	9,608,463	5,860,300

The receipts last month were less than those of the corresponding month of any other year named above, except February, 1884.

The west-bound shipments from New York via the trunk lines, destined to their Western termini and points beyond, amounted in February to 89,428 tons. While this was about 6 per cent. less than the January shipments, it was an exceedingly good February business, as will be seen from the following statement of the February business from New York during the last ten years, in tons:

1878	51,035	1883	89,418
1879	56,304	1884	95,211
1880	88,103	1885	83,873
1881	78,354	1886	84,063
1882	117,123	1887	89,428

Thus the amount of shipments in February of this year has only been exceeded by the business of the corresponding month of two years. In 1882, the February shipments were 32 per cent. greater than last month's business; and in February, 1884, the business was between 6 and 7 per cent. larger than last month. However, if the Lehigh Valley shipments from New York were included in the last month's tonnage, the total shipments would probably have about equalled those of February, 1884, and the difference between last month's shipments and the movement in same month of 1882 would only have been about 12 or 13 per cent.

Such a showing must be very gratifying to the roads, especially after the unusually large traffic of the last five or six months.

The shipments in February from the other seaboard cities (Boston, Philadelphia and Baltimore) amounted to 54,735 tons, and for the same months of the last eight years have been, in tons:

1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.
65,729	54,074	64,885	51,849	55,390	61,072	50,017	54,735

While the February business of these three cities does not make so favorable a comparison with the business of the same month of former years as the New York traffic does, still they had an average month's business.

The total shipment from the four ports during the month of February for the last eight years have been in tons:

1880	153,832	1883	141,267	1886	134,980
1881	132,428	1884	150,601	1887	144,160
1882	182,008	1885	144,945		

The east-bound through freight tonnage of the trunk lines in February was 741,250 tons. This includes all freight forwarded from trunk line Western termini and destined to any point East, with the exception of live stock and dressed beef. While the February business this year was 125,000 tons less than the amount of traffic last year, it was still a very fair February business, as will be seen from the following statement showing the amount of February shipments for the last eight years:

Year.	Tons.	Year.	Tons.
1880	638 470	1884	597,703
1881	739,417	1885	842,213
1882	686,256	1886	856,294
1883	731,328	1887	741,250

Thus the business last month was 13.5 per cent. smaller than in same month in 1886, and 12 per cent. smaller than in February, 1885. It was, however, a larger business than that of the same month of any previous year; and it must be considered a very good showing that the traffic was so large as it is after the unusually large traffic that the roads had for the seven months previous.

Among the relics of a former generation which still survive in railroad circles, but which the millennium, if it ever comes, will reform out of existence, are the sonorous train announcers in some of those typical American institutions known as "Union Depots." Notwithstanding the fact that all observant people, including the superior railroad officers, can see that not one word out of ten can be understood, and in careless disregard of the admitted fact that even when using an ordinary tone of voice in a common sized room or car, the average brakeman's pronunciation is more unintelligible to a stranger than the utterances of a soprano church singer, these station noise-spreaders are still suffered to fool away their time and annoy the public. A young colored fellow or some one else with a thickly calloused skin which entirely precludes any real appreciation of the actual wants of the waiting passenger, enters a large room having a very high ceiling and calls out the name of a train, the time of its departure and the names of its chief destinations, in a way that gives positive evidence that his only desire is to agitate the acoustics of the whole apartment and to test the resonance of the rafters. So far as any real good is concerned a cracked gong, well thumped, would answer every purpose and produce a much pleasanter effect. It would serve to warn passengers that *something* was about to happen, and give them a chance to get up and make inquiry, or examine the clock and time-tables. Whether the present fashion accomplishes more than this, in ninety-nine cases out of a hundred, is open to serious question.

The opening of the bids for steel armor plates and gun forgings, chronicled in our news columns to-day, is an event of singular interest. It marks the beginning of a new industry in this country, and one likely to grow to great magnitude. It is not probable that the country will be content to go on long without armored forts and ships, and modern heavy guns, whatever may be the fluctuations of opinion from year to year. Moreover, the plant built under the inspiration of this year's appropriation will be available for the heaviest marine forgings. American ship-building may not revive as rapidly as every patriotic man hopes, but revive it will; and when American ships again carry three-fourths of all her ocean commerce, and a big part of the commerce of other nations, the men who are now getting ready to make armor plates and gun forgings will find that swords make the best sort of plough-shares.

In our news columns will be seen mention of the intention of the St. Paul, Minneapolis & Manitoba to build 670 miles of road between now and November 23 next. This, if done, will surpass, by far, anything ever accomplished before in fast railroad building. On the Union Pacific, in the great race of the Union and Central Pacific for position, 535 miles were built in one year and 20 days. This was from the end of Dale Creek bridge, near Sherman, to Promontory. More grading was done beyond the track laid than had been done at the beginning.

In the summer and autumn of 1882, a remarkable piece of work was done on the Canadian Pacific. In 182 working days (including stormy days) 435 miles of track was laid, including considerable bridging. About 5,000 men and 1,700 teams were employed.

The Journal of the Franklin Institute for March contains a paper on the Microscopic Structure of Iron and Steel. The author argues very plausibly that, as much may be learned of the physical properties of a given specimen by a simple inspection of the fracture, more must be learned by a microscopic examination. He treats of the preparation of specimens, and of the uses of photography in illustrating them, and then considers the microscopic structure of the different varieties of iron and steel. He suggests that there is no department of metallurgy in which the microscope can be used to greater advantage than in the study of the minute structure of steel rails.

The paper is valuable for the suggestions of methods and objects, rather than for any results recorded.

Some interest is naturally felt in the outcome of a project to start flour mills in Brazil. It is stated an English Milling Company is to be established in Rio de Janeiro, with a capital of £500,000, and dividends of 25 to 30 per cent. are promised. From *Bradstreet's* we learn that our shipment of flour to Brazil in 1886 was 542,499 barrels, valued at $2,674,327. The next greatest consumer of our flour is the United Kingdom; and Brazil takes about 7 per cent. of all our export of this product. The effect on return trade of the loss of this trade would be very serious. But as Brazil must import the wheat, coal, machinery and skilled labor, the project hardly looks dangerous.

Several Forney car seats capable of comfortably seating two persons have been fitted on the drawing-room cars on the Boston & Albany trains leaving New York and Boston at 4.30 p. m. One person can occupy this double seat for the usual charge for an ordinary drawing-room chair, capable of seating one person only. If two persons occupy one seat, each will be charged the usual fee. This system of giving an extra roomy seat is an experiment which appears likely to succeed, as the passenger gets increased room, and is able to change his position, while the railroad company have a fair chance of carrying a greater number of passengers in the car.

Record of New Railroad Construction.

Information of the laying of track on new railroad lines in 1887 is given in the current number of the *Railroad Gazette* as follows:

Cape Fear & Yadkin Valley, in Stokes County, N. C., 4 miles since last reported.

Georgia Midland & Gulf, in Georgia, 6 miles since last reported.

Louisville & Nashville, Birmingham Mineral branch, in Alabama, 8 miles.

San Bernardino & Los Angeles, to Cucamonga, Cal., 5 miles since last reported.

South Chicago & Southern, from Colehour Junction, Ill., to Hegewish, 5 miles.

This is a total of 28 miles for the week, making 616 miles reported thus far for the current year. The new track reported to the corresponding date for 16 years has been:

	Miles.		Miles.		Miles.		Miles.
1887	616	1883	521	1879	298	1875	429
1886	205	1882	1,181	1878	326	1874	198
1885	165	1881	541	1877	165	1873	429
1884	334	1880	975	1876	304	1872	642

This statement covers *main track only*, second or other additional tracks and sidings not being counted.

The Uniform Code.

Below will be found some samples of general and train rules, which in substance are mainly in accord with the views of the Time Convention Committee, but which are re-written with a view to placing them in what may be called a peremptory form, a form more naturally adapted to the use to which they are really put, that of a manual for reference by one person who is orally giving instructions to another. We deem it important to take great care in arranging the rules so that, where possible, cognate topics will stand in natural juxtaposition, so that when a man reads one rule, and is by its reading naturally led to look to another, he will not have to search long to find that other; but it is, of course, impracticable to exemplify that idea in a mere collection of fragments as this necessarily is.

The ideal way for a superintendent to qualify his trainmen or other subordinates, whether he have a dozen or a thousand, is for him to tell them exactly how to act under all circumstances; and to do this easily and thoroughly, a manual in his hand, from which he can *read* just what he wants to say, no more and no less, is the most natural aid. The reader should, therefore, in passing opinion on these forms, imagine himself using them in practical work, and question whether he could, in his own case, profitably add to or take from them anything that would enable him to better convey his ideas to another person. And a man reading his rules by himself is benefited by any form of language or other device that will tend to impress his mind with the idea that he is being talked to by an individual outside himself, whose whole attention is, for the time, centred in him and in the purpose of causing him to know certain things. Whatever advantage there may be, therefore, to an instructor who personally meets his pupils is equally to the benefit of those who depend wholly upon the printed page, and are satisfied with the assurance that their men have simply read the rules.

Space forbids the publication of the complete code in the form contemplated. Instead of trying to cut up the code, giving to each class its portion and leaving the aggregate the same as before, the aim has been rather to *increase* the total amount of matter, making, instead of one code to fit, say, half a dozen classes, six different codes, each embodying a large portion of each of the others, but with the difference that in each some one class of rules—those affecting the class of men contemplated—is made prominent and all the others subsidary, while in each of the other class-codes the rules which in this were prominent will appear as secondary. For example, to look out for a torpedo signal, and to know how to act when one is encountered is, for an engineman, of the first importance; but for a conductor it is merely general information and should not by any means occupy the important place that it does in the engineman's code. To place such matters as these in a clear light and relieve trainmen of the necessity of finding out for themselves the comparative value of different rules, is believed to be a work well worth doing.

The rules which exemplify views materially at variance with those brought out at the convention are simply embodiments of criticisms which we expressed editorially after the sessions of the convention. They are not inserted here with a view of unduly pressing them on the reader's attention, but rather because this is a simple way of illustrating in tangible form the views expressed.

TIME TABLES.

You must always have at hand, when on duty, an official time table, and be governed by it in all your duties connected with the running of trains. Time tables are issued by the Division Superintendent, and contain the schedules of all regular trains on the division for which they are issued. The list of times showing when a certain train begins and ends its trip and when it reaches or departs from intermediate stations is the *schedule* for that train.

Where but one time is shown upon the time table for a train at any station, that time is the leaving time. Where two times are shown the earlier is the arriving and the later is the leaving time. Small figures (1, 2, 3, 4) indicate that the train does not regularly stop at the station against which they are placed. Ordinary figures (1, 2, 3, 4) indicate that the train does stop at the station against which they are placed.

The letter "f" indicates that the train may be stopped at the station against which it is placed, to receive or discharge passengers or freight.

The sign ¶ indicates that the train stops for meals at the station against which it is placed, and that the length of the stop must never be shortened.

In the schedule of a train the places where it should regularly meet or pass another train or trains are indicated by letters and figures in the following manner:

m 1st means meet first class train.

m 2d means meet second class train; and so for any class. For example:

"m 1st 518"—meet first class train No. 518.

The letter p means pass. For example:

"p 2d 300"—pass second class train No. 300.

The word "daily" at the head of a schedule indicates that the train is run every day in the week, including Sundays. The words Saturday, Sunday, etc., in a schedule refer to the day on which the trip is begun.

(A train whose schedule extends from 11 p. m. Saturday to 1 a. m. Sunday is entered as "Saturdays only." A train whose

schedule extends from 11 p. m. to 1 a m., and which starts every night except Sunday night, is entered as "Daily except Sunday," although its Saturday trip extends into Sunday.)

Each time table, at the moment it goes into effect supersedes the previous time table and all special instructions relating thereto. All regular trains on the road running according to the preceding time table will, *unless otherwise ordered*, assume the schedule of trains of corresponding numbers on the new time table.

SIGNAL RULES.

SIGNALS.

Flags of the proper color must be used in day time and lights of the proper color in the night or whenever it is dark. Whenever you are in doubt whether to use a flag or a light use both.

Red signifies **danger**, and is a signal to stop.

Green signifies **caution**, and is a signal to go slowly.

White signifies **safety**, and is a signal to go on.

Green and white is a signal to be used to stop trains at flag stations for passengers or freight.

Blue is a signal to be used by car inspectors.

An explosive cap or torpedo, placed on the top of the rail, is a signal to be used **in addition** to the regular danger signals.

The explosion of **one or more** torpedoes is a signal to **reduce speed** immediately and look out for a danger signal.

A fusee is an extra danger signal to be lighted and placed upon the track at night and in tunnels, and whenever there is a fog.

A flag or lamp swung across the track, a hat or any object waved violently by any person on the track, signifies danger, and is a signal to stop.

TRAIN SIGNALS.

Two green flags by day and two green lights when it is dark, displayed in the places provided for that purpose on the front of an engine, denote that the train is followed by another train, running on the same schedule, and entitled to the same time-table rights as the train carrying the signals.

Two white flags by day and two white lights when it is dark, displayed in the places provided for that purpose on the front of an engine, denote that the train is an extra. These signals must be displayed by all extra trains, but not by yard engines.

When an engine is running backward pulling a train, or without a train, the classification signals as per rules 37 and 38 must be displayed in the places provided for that purpose on the tender. When an engine is pushing cars ahead of it, the classification signals must be displayed on the front of the leading car which is being pushed.

When an engine is the hindmost vehicle in a train the green markers and the red night signals must be displayed upon it. If it is running front first the signals must be on the tender. If it is running backward the signals must be on the buffer beam near the pilot (cow-catcher).

A blue flag by day and a blue light when it is dark, placed on the end of a car, denote that car inspectors are at work under or about the car or train.

BELL-CORD SIGNALS.

One tap of the signal-bell, when the train is **standing**, is the signal to start.

Two taps of the signal-bell, when the train is **standing**, is the signal to call in the flagman.

Three taps of the signal-bell, when the train is **standing**, is the signal to back the train.

Two taps of the signal-bell, when the train is **running**, is the signal to stop at once.

Three taps of the signal-bell, when the train is **running**, is the signal to stop at the next station.

Four taps of the signal-bell, when the train is **running**, is the signal to reduce speed.

Signals of the same number of sounds mean the same when given by other appliances than bell-cords and signal-bells.

Enginemen.

When you are in doubt what a signal means, or when you fail to find a signal where one is usually shown, you must at once bring your speed under control, and proceed only as the way is known to be clear, until you get beyond and off from that portion of the road which the signal is designed to cover. When you encounter a signal that is dirty or dim, so that it cannot be clearly seen at a proper distance, or that is otherwise defective, you must report the fact to the division superintendent.

(Rule requiring special reports of failures of electric or other signals should go in here.)

If, when running, you hear one tap of the signal bell you must expect that the train has parted, and act accordingly.

When you are running without a train and when you are pushing a train you must see that red and green rear signals are displayed as per rule.....

Whenever you have charge of a red flag or light, you must be careful not to exhibit it unnecessarily, or to any engineman whom it is not intended to stop.

(This goes into conductors', brakemen's, agents' and firemen's rules.)

You must, at the beginning of each trip, see that your engine is supplied with two red lanterns, two white lanterns, two green lanterns or signal lamps, two white signal lamps, two bright green flags, two bright red flags, 12 torpedoes, and 6 fusees.

(Rule requiring axes, jacks, chains, etc., goes in here.)

You must regulate your speed so as to run as evenly as possible, and not arrive at any station earlier than the schedule arriving time. Where no arriving time is shown you must regulate your speed so as not too arrive at any station more than two minutes before the shedule leaving time; and, where no arriving time is shown, if the business of the station is likely to require less than two minutes you must calculate so as to stop only as long as will be necessary.

Whenever you run over one or more torpedoes you must reduce speed at once and proceed only as the way is seen to be clear. If you see no flagman and encounter no obstruction within one mile from the torpedo you may then proceed at your regular speed.

Whenever you find a burning fusee upon the track you must reduce speed at once and not pass the fusee until it is burned out; or, if it be necessary to pass it you must keep your speed under control until you learn the whereabouts of the preceeding train or until you have lost five minutes.

When you see a danger signal displayed to your train, you must at once sound two short blasts of the whistle, so that the person in charge of the signal may know that you have seen it. This rule has no reference to fixed signals.

You must see that the bell is always rung immediately before starting.

At a point 80 rods before reaching each highway crossing you must see that the bell rings, and that it keeps ringing until the crossing is passed.

You must see that the bell rings at all times when the engine is in motion within 80 rods of a passenger station, when passing through tunnels and through the streets of a city.

At a point 80 rods before reaching each highway crossing you must sound the whistle, as per Rule 51, except that in *clear weather* it may be omitted at crossings where there is a regular flagman or gateman.

You must sound the whistle, as per Rule 41 (at the post set up to indicate the place), on approaching each station.

No blast of the whistle should ever exceed three seconds' duration, and every blast must be made as short as the necessities of the case will allow. The whistle must never (except in an emergency) be sounded while passing a passenger train and, unless there is imminent danger, *it must not be sounded except as above*, and to give necessary signals. It must not be used to call switchmen or others.

(NOTE.—The numerous crossings where whistling may be omitted during the night when there is little travel should be indicated in a local notice or in the time-table.)

When you are near the main track but not on it you must be careful to see that your headlight does not shine in the face of an approaching train so as to obscure the view of signals from that train. Cover the headlight when necessary; Also cover it whenever it may mislead any approaching engineman.

Station Agents.

You must compare all clocks in your station every day with the standard time as sent by telegraph at 4 p. m., and see that they are kept running, and that they always show correct time.

You must keep constantly at hand in your office, ready for use without delay, three bright red flags, two bright green flags, two red lanterns, two green lanterns, one white lantern and six torpedoes.

You must use the green and white signal to stop trains which the time-table shows may be stopped at your station for passengers or freight, and for no other trains. Whenever it becomes necessary to stop any other train, or to stop these trains for any other purpose, use a red signal.

Conductors.

When your rear brakeman has been back and placed torpedoes on the rail according to the rule, you may, when ready to go on at regular speed, call him in, **provided**—

First, that there is a clear view from your train of at least *three miles* in one direction, and *half a mile* in the other direction; and

Second, that no first or second-class train is due within 10 minutes.

(*b*) When you *know* that the train next behind you is one that runs no faster than 15 miles an hour, the view (as above) may be *one* mile instead of three miles.

(*c*) When you are stopped where there is a clear view *half a mile* back of you and *to a station yard* ahead of you, you may call in the brakeman (after he has placed the torpedoes), provided no first or second-class train is due; but in that case *you must see* that the station agent exhibits the proper signal to stop any train that may follow you too closely.

(*d*) When within the limits of a station yard, you may call in the brakeman at any time when no first or second-class train is due.

(*e*) Except as provided in this rule, you must *never call him in* until your train is clear of the main track; but—

(*f*) When you can and do move your train forward fast enough to keep half a mile ahead of the brakeman, you may signal him to follow, being careful not to let him come within half a mile of you. Then, when your train gets within a station yard, you may, if no first or second-class train is due, call him in.

(*g*) You must never rely *wholly* on torpedoes for protection, and never rely on them *at all* when more than a mile away from them.

Five minutes before the time for the arrival of any train of a class higher than yours you must clear the track on which it is due.

You must not follow any train within five minutes, unless authorized by the time-table to do so.

You must be careful to note all blue signals displayed, as per Rule ...., and never allow a car protected by such a signal to be moved or coupled to; and you must be careful not to place other cars where they will obscure the signal.

In switching you must never allow a car to be moved unless a brakeman is in a position to control its speed and to stop it with safety.

When cars are *pushed*, or are moved without an engine, you must see that, while near a passenger station, or while passing close to a car containing passengers, or when approaching or crossing a street, they do not move faster than at the rate of six miles per hour, and that a man is in a position to warn persons off the track. When it is dark the man must have a light.

You must, at the beginning of each trip, see that your train is supplied with two bracket tail lamps arranged to show red to the rear and green to the sides and front, one white tail lamp, three red lanterns, two bright red flags, two bright green flags, twelve torpedoes, six fusees and as many white lanterns as there are trainmen.

You must never start from a station before the schedule leaving time.

You must always have with you when on duty a reliable watch, which has been examined and certified to on form W by the watch inspector of the company at ..... Every six months you must get a new certificate and file it with the [division superintendent].

You must regulate your watch by one of the standard clocks before starting on each trip, and at the same time enter in the book, Form X, your name and the hour you make the entry.

Conductors:
On Single Track,

when running in a direction from ....., you must keep out of the way of trains of the same class as yours, which are running toward ....., being careful to clear the main track three (3) minutes before the leaving time of the opposing train. You must make it a rule to go into the siding at the nearest end of it. If you are obliged to go by and back in, you must send a man forward according to Rule 101, and you must not pass the switch until the man has had time to reach a point half a mile beyond the switch. When the train dispatcher gives you a special order to run by and back in, you need not send the man with signals unless the order tells you to.

When running towards ..... you have the right to the road over trains of the same class as yours running in a direction from .....

On approaching any station where you are liable to meet a train of the same class as yours you must see that your speed is brought under control so that you will be able to stop if necessary before blocking [fouling] the track which the opposing train will use in going on to the siding.

When near a station and you are short of time to clear a superior train you may follow another train in less than five minutes provided your speed is under control.

Passenger Conductors.

You must have oversight over mail agents, express messengers, parlor and sleeping car conductors and porters, news-agents, and persons in charge of individual cars, and see that, while on duty connected with your train, they do not violate any rule of this company.

Where the .... train signal is in use you must have it tested at the beginning of each trip to assure yourself that it is in working order.

Each car in the train must always be in communication with the engine; while in motion you must always have enough rope on the train to use in case the ..... train signal is out of order or not available. The rope, when used, must be run through the train and *fastened* to the rear end of the rear car *before starting*.

At the beginning of each trip you must have the ..... brake tested to assure yourself that it is in working order.

You must, where unable to do this testing of signals and brakes personally, have the rear brakeman attend to it; and in each case after he has seen that all is right *tell you so*, by word or motion. And you must have him, at the same time, assure you that he has provided the proper tail signals for the train.

You must always, when on duty, wear a badge reading: (Here give full description of badge, cap and clothes).

Rear Brakemen.

In the day time you must keep bright green flags displayed on the rear car, one on each side, on or near the top where it can be best seen from the engine of your train, and both of them where they can also be plainly seen by any one approaching from the rear.

At night, or whenever it is dark or whenever a light can be seen better than a flag can, you must keep tail-lights displayed on the rear car, one red on each side on or near the top and one white on or near the platform or buffer, all where they can be plainly seen from the rear, and one green on each side near the top where it can be best seen from the engine of your train.

You must keep, in the day time, a bright red flag, and in the night and whenever it is dark a lighted red lantern inside the rear car.

Whenever your train runs more slowly than usual you must keep close watch of the time, and if it loses more than .... minutes between any two stations, you must put out fusee signals, one every mile, until you resume your regular speed, unless you can see plainly that there is no train following within 3 miles. If you know that you are being followed closely by a third-class (slow freight) train, the extent of the view here referred to may be one mile instead of three miles.

Whenever, outside a station yard, your train or any part of it stops, or whenever its speed is slackened so that you are likely to lose three minutes or more, you must **immediately** go back with danger signals to stop any train moving in the same direction. You must go at least **1,200 yards**, unless a train is met nearer, and you must place **two** torpedoes on the rail ten yards apart both at least 1,200 yards from your train. If a train arrives you must, after stopping it, return to your own train. If no train arrives you must keep at least **900 yards** behind your train until recalled by the whistle of your engine or by an order from your conductor. If you are called in before any train arrives you must leave the two torpedoes fastened to the rail unless you know that your train is within a station yard. If you find that your train is moving forward slowly you must follow it, keeping 900 yards behind it, and place two torpedoes on the rail (10 yards apart) every mile. When left by your own train you must get on to the next following one, and proceed to your own as soon as possible.

Whenever a first or second-class train is due within 10 minutes this rule must be observed just as carefully within a station yard as though you were outside of a yard. These trains have the same right to run at full speed through yards that they have on the open road.

Crossing Watchmen and Gatemen.

You must always have at hand a bright red flag, and when it is dark a lighted red lantern, for use in stopping trains when necessary; but you must be careful not to show any red signal to any engineman whom you do not wish to stop.

The flag or lamp you use to signal to persons crossing the track must be yellow [white].

Bridge Repairers and Track Foremen.

Where there are two or more places in the track over which trains must be run with extra care, you must place a separate green caution signal for each place, unless the several places are near together and within plain sight of each other.

While many of these rules affect other classes than those for which they are here prepared there is still a large number which, it will be seen, can with profit be removed from the notice of a large share of the employés; and those which do concern different classes need rewriting, because by minor changes in wording the sense can be improved. Take for example the rule giving instructions about car repairers' blue signal; to the brakeman it should say "you must never move such a car or couple anything to it," etc., while to the conductor it is better to say "you must see that such cars are not disturbed," etc.

The code of signals concerns so many classes, and is so brief, that it deserves a place in general rules (where it has been placed), even though nearly all its points can be covered in individual instructions to the various classes.

The places contemplated in rule 96 should be indicated by posts or other suitable device, and also noted on the time-table in proper order. Many other places, including all where any switching of consequence is done, should also be included in the same class with these, at least so far as regards all but passenger trains. Moreover, the rule should require runners to keep their speed under control until switches *and* signals are seen to be right *and* the track is seen to be clear. The rule should be put in this, the most rigid form, and then in cases where it can be relaxed, a special local rule provided. Where the loss of time necessary to reduce the speed cannot be afforded, the best home and distant signals should, of course, be maintained so as to provide for foggy weather.

The rule concerning fusees is inserted, not because it is expected that it will meet with very general approval, but merely to illustrate that where fusees are to be used, a rule going into minute particulars is necessary in order to avoid waste and extravagance.

Foreign Technical Notes.

It is announced from St. Petersburg that the Russian Government has sanctioned the construction of a railway from the Baikal Lake to Sretensk, on the Amur. The Baikal is distant about 60 versts from Irkutsk, and the new railway would offer facilities for moving, within a comparatively short time, large masses of troops to the Chinese frontier or to Vladivostok. At the same time, the number of steamers on the Baikal and Amur] is to be largely increased. The construction of the new railway is to be superintended by

General Annenkoff, the engineer of the Trans-Caspian Railway, and work is to be commenced at once.

The *Iron Trade Exchange* (England) has the following:

In compliance with a request from some of the managers of some of the railway companies and leading firms in New York and other large towns in America, Mr. Willing will shortly proceed to New York for the purpose of establishing works at Philadelphia or other manufacturing centre for the production of the famous iron tablets manufactured in this country, which are now universally used in England, and in most parts of France, Belgium, Germany and India.

The London & Northwestern Railway Co. have decided, according to the *Railway News*, to appropriate 30 acres of land owned by them at Crewe for a public park and to expend £10,000 in laying it out, in honor of the 50th year of Her Majesty's reign. As Crewe is the seat of their principal shops and nearly all its inhabitants are employed by the company, this is an act of most commendable generosity.

Foreign Railroad Notes.

The Russians have completed the Novorissisk tunnel, 4,500 feet long, and there is every prospect that St. Petersburg will have railway connection with the Caspian during the spring.

The traffic on the Trans-Caucasian road must be developing satisfactorily, as the government have issued an order for 18 new locomotives and 1,296 freight cars for this line.

The St. Gothard tunnel and railroad have given Germany and Austria such advantages in the matter of trade with Italy over France and Belgium that it is probable a new tunnel will be opened in French interests.

New routes are proposed via Simplon, Mont Blanc and Mont St. Bernard. The surveys show that the distances between Paris and Milan are: Via St. Gothard, 667 miles; Mont Blanc, 683 miles; St. Bernard, 639 miles, and by the Simplon, 583 miles. The length of tunnel by this line would be 12.4 miles. Estimated cost, $10,600,000 for a single line, and $12,600,000 for a double line.

Indian Railway Extension.

The Rothschilds have negotiated £3,000,000 for the Bengal Nagpur Railway. The capital, which had a government gaurantee of 4 per cent., was subscribed for five or six times over. The company is to take over 149 miles of narrow gauge road, which it will convert to the Indian standard, 5 ft. 6 in., and will build other lines amounting to 784 miles in all; one of which will connect the East Indian with the Great Indian Peninsular Railway.

Herapath's *Journal* says of this translation: "While we have been pouring money into America and Canada to build competing railways which never can by any possibility be made to pay, our great Indian empire has been overlooked. There is room for the profitable employment of one hundred millions in railways in India and Burmah." Adding: "It is expected that this year something under one thousand miles will be constructed in India, while between eight and nine thousand miles were constructed in Western America last year."

The Engineer on the same subject asks: "If the railway extension of India is so advantageous as has been demonstrated and admitted grudgingly by Secretaries of State, why should the line be drawn at 800 or 1,000 miles of railway construction per annum? Viscount Cross, Secretary of State for India, said that the average return for Indian railways was £5 12s. 6d. (5.625 per cent.), and he hoped the Chambers of Commerce would use influence in support of calls for English capital for developing them."

The development of colonial and Indian roads has, according to Mr. J. S. Jeans, increased the imports of their wheat into the United Kingdom from 2,400,500 bushels in 1868 to 30,185,873 bushels in 1882, and the average price of wheat in English markets has fallen from $1.94 in 1868 to $1.36 in 1882.

THE SCRAP HEAP.

Did Not Intend to Spoil his Brogue-ands.

Brakeman—"Oconomowoc!"

Hibernian Passenger—"O'Connor may walk! Will, thin, O'Connor won't walk. He's paid his fare like any other gintleman, and O'Connor will ride."—*Buffalo Express.*

Any Relation to Walla Walla, Wash. Ter.?

SHANGHAI, March 22.—Foreign promoters of a project to build a railway joining Lotaitaku to Tien Tsin are much chagrined because Li Hung Chang has sanctioned a proposal that Chinese labor must be used in the construction of the road.

The Hammer Blow.

Among the witnesses who testified before the Board of Railroad Commissioners, with reference to the recent accident at Roslindale, was Mr. William E. Lockwood, of Philadelphia, the Superintendent of Motive Power of the Beach Haven, International, Intercolonial & Interoceanic Railroad and Clambake Transportation Company, who is an expert on the important subject of "The hammer blows of a locomotive's driving wheels." Mr. Lockwood believes that such blows had considerable to do with causing the recent accident. He came to the conclusion that "the centrifugal, tangental, hammering, swaying, gyrating, 'weewahing,' nosing around, rocking, thrustiug, rolling forces, in combination with alternating and the varying speeds, from 0 to 120 miles per hour, 10½ times a second, I can so combine, that when 'she has her nose down,' she cannot right herself, and must roll off the rail, because, perhaps, her centre of gravity was too high."

This is very shocking, and it is to be hoped that no sober, right-minded locomotive will emulate such a shocking example, but will, like a sagacious elephant, make an automatic pause before crossing a dangerous bridge and refuse to stir until a competent civil engineer has certified that the painter's brush can penetrate the innermost recesses of the bridge, and that it is not so designed that its existence wholly depends on two bad welds. Unless locomotives assemble in round-house convention and elect delegates to assert their rights, there is a chance that the innocent locomotive's hammer blow will be blamed for the fall of every bad bridge.

Charity with Stockholder's Money.

Sir Edward Watkin is, indeed, a potent personage. He has got the Metropolitan Railway to vote £500 to the Imperial Institute and the South Eastern £1,000. Of course dissentients can have their quota back on demand, and let us hope a good many will take Sir Edward Watkin at his word, and demand the money back. There is no question of loalty in the matter; but there is a great principle involved. It is this—whether a man himself is to be the dispenser of his own charity or liberality, or whether others are to step in, do it for him, and of course have the credit.—*Herepath's Journal.*

It is related that at a board meeting of one of our large insurance companies, when it was proposed that the company subscribe to some charitable project, one of the directors proposed instead a personal subscription offering to lead off with $50. It is not recorded that any subscription was made, but *that* director was not re-elected.

Deep Lakes.

We have always thought that the United States took the cake for deep lakes. Lake Tahoe, for instance, was counted the deepest lake in the world until Crater Lake was measured. But we have to yield to Siberia. From *Engineering* we learn that Lake Baikal is over 600 kilometers long and from 30 to 90 kilometers broad, while "its depth varies from 1,000 to 1,400 *kilometers.*" It's no use. We give up the struggle.

TECHNICAL.

Locomotive Building.

The Norfolk & Western has contracted with the Baldwin Locomotive Works for the immediate construction of 18 large engines—6 passenger, 6 consolidated freight, and 6 yard engines.

The Car Shops.

The Wagner Palace Car Co. is building a train for the New York Central & Hudson River road which will contain such innovations as a bath-room, *barber shop* and library. There will be side-gates and canopies on the platforms, and the cars will be lighted by electricity. [They must use patent razors in those barber shops.—ED. GAZETTE.]

The Pullman Car Co. is building six of its best cars for the Grand Trunk Railway, to be used on the Maine division between Portland and Island Pond. They are to be delivered about April 1.

The Muskegon Car Co., of Muskegon, Mich., has been reorganized, with John Torrent as President, H. Ryerson, Treasurer, and L. C. Burgess as General Manager. The works will have a capacity of 12 cars per day.

The Lehigh Car Manufacturing Co. have closed their shops at Stemton for want of work.

The Alabama Car Works, Anniston, Ala., have a contract with the East Tennessee, Virginia & Georgia Railroad for 350 cars, and another with the Texas & Pacific Railroad for 400 boxes and stocks.

Bridge Notes.

Bids for the building of a bridge across the Guadalupe River, near New Braunfels, Tex., will be received till April 4 by H. E. Fischer, Judge of Comal County, Texas.

Tenders will be received until April 4, for the construction of the masonry, iron or steel superstructure, and approaches for crossing the Sault Ste. Marie River and canal at Sault Ste. Marie, Mich. The work to be commenced immediately after signing the contract, and to be completed by the end of November, 1887. Tenders will be received for the entire bridge and approaches; also for the masonry and approaches, and for the superstructure erected, separately. Proposals should be addressed to P. Alexander Peterson, Chief Engineer of the Sault Ste. Marie Bridge Co., office of Canadian Pacific Railroad Co., Montreal.

Ground was broken at Decatur, Ala., March 10, for the Decatur Iron Bridge & Construction Co.'s Works. The plant will be in operation in four months. Mr. George S. Mooar, of Birmingham, is the president and principal stockholder, and R. W. Curtis, of Chicago, Ill., vice-president.

The Phœnix Bridge Co., Phœnixville, Pa., has received the contract to build the iron bridge across the Potomac River, at Shepherdstown, W. Va., for the Shenandoah Railroad Company.

The Fort Smith (Ark.) Bridge Co. has been organized with $400,000 capital.

Iron and Steel.

The name of the company incorporated at Tuscaloosa, Ala., to build a 100-ton furnace is the Friedman Furnace Company. The incorporators are B. Friedman, W. C. Jemison, J. J. Harris, J. W. Casteman and W. G. Cochran.

At a meeting of the stockholders of the Midvale Steel Company, Philadelphia, it was decided to increase the capital stock of the company from $750,000 to $1,500,000—just doubling it.

The exports of steel rails from Belgium last year amounted to 38,463 tons. The corresponding exports in 1885 were 56,822 tons; and in 1884, 64,650 tons.

It is expected that one of the blast furnaces on Breaker Island, Troy, N. Y., will be ready for operation in three weeks. There are four railroad tracks on the trestlework leading from the Delaware & Hudson road to the stock house on the island, on which, when the furnaces shall be in full blast, trains will be kept busy carrying material for the manufacture of between 500 and 600 tons of pig iron a day.

It is reported that the Boston and Colorado Smelting Company contemplate removing their extensive plant at an early date from Denver, Col., to Aurora, Ill.

The Findlay (O.) Iron & Steel Co., $100,000 capital, has been incorporated.

The New York office of the Pennsylvania Steel Co. is now at No. 2 Wall st.

A contract has been made by the Decatur (Ala.) Land & Improvement Co. by which capitalists from Chicago and Birmingham agree to erect at that place a manufactory for the purpose of making all kinds of bridge iron, etc. The company has just been incorporated and expect to have their works in full operation within four months. The officers are: George S. Mooar, of Birmingham, Ala., President; R. W. Curtis, of Chicago, Ill., Vice-President; Edward D. Almstead, of Birmingham, Secretary and Treasurer; John A. Langdon, of Dayton, Ohio, Superintendent of Construction.

The Rail Market.

Steel Rails.—In standard rail sections the business for the week has been light, with quotations at $39@$40. In Light Rails there have been some sales of round lots. It is reported that a sale has been made of 3,000 tons of Foreign Rails at private terms.

Old Rails.—The Old Rail market continues demoralized. Double Heads on dock and in port have been offered at $22.50@$23, and there have been sales of round lots at the lower figure. Tees are offered at less than $22.50 afloat.

Rail Fastenings.—Spikes, 2.55@2.70c. delivered; Angle Fish Bars, 2.20@2.25c.; Bolts and Nuts, 3.10@3.20c.; and Bolts and Hexagon Nuts, 3.35@3.55c.

Exporting Cars.

The steamship Geyser, of the Thingvalla line, recently sailed from New York with 10 refrigerator cars on board, with which to inaugurate in Denmark the American system of transportation in refrigerator cars. The cars are like those in use in this country, except that they are smaller in size, have four wheels instead of eight, and have iron platforms. The cars are sent over in sections, and will be put together on reaching their destination. It is the first shipment of the kind made to Denmark.

The Frost Light.

A car fitted with the Frost light is now running between New York and New Haven, leaving the Grand Central Depot at 4.45 p. m. every day. The light is remarkably brilliant and very steady. The Frost light has already been illustrated in these columns, but since then many improvements have been made in details, with very satisfactory results.

Improved Ferryboat Engines.

An important improvement has been introduced in a ferryboat lately built to run between New York and Staten Island. A pair of inclined compound engines have been substituted for the time-honored single cylinder with walking-beam. The inclined engines take up far less room, are expected to use far less steam, and will exert considerably more power for their weight, thus enabling a higher speed to be obtained.

The Baker Heater.

W. C. Baker, President of the Baker Heater Co. of New York, appeared before a committee of the Connecticut Legislature last week at a hearing given to representatives of the various car-heating companies. Mr. Baker made a strong address, urging the necessity of the introduction of patent heaters into the cars run on Connecticut railroads.

Compound Locomotives in Denmark.

A round house foreman in Denmark writes as follows to the London *Engineer:*

Over a year since, Mr. O. Busse, Locomotive Superintendent, Danish State Railway, Arhuis central shops, built a compound goods engine, and it has been running since, and has given pretty satisfactory results; in fact, something very similar to Mr. Worsdell's engine, saving from 1½ to 2¼ tons per week. This engine was one of a class of goods engines from Stephenson's, Newcastle-on-Tyne, 15 × 22 cylinders, 4 ft. 6 in. wheels, six-coupled, and, after having run 18 years it was found necessary to give it a new boiler and cylinders. Mr. Busse concluded to make a new engine of her, and made her into a compound with 16 in. high-pressure and 23 in. low-pressure cylinders, using the same wheels and stroke; slide valves worked by Stephenson's gear. The engine when finished was, as far as workmanship and design goes, equal to anything produced either in England or Germany, and the trial trips proved that the engine was perfectly qualified to do the work expected of her.

The first day's trial was with a train made up of heavy loaded coal trucks weighing 250 tons exclusive of engine and tender. The trial was over a rough road rising 1 in 100 the first five miles, with many nasty curves. Weather moderately fine. She took that train up the hill like a house on fire. I was with others on the foot-plate, and I was a little surprised to see the amount of steam got so easy with the coal she was supplied with. Coal! well, it looked more likel what they used to ballast the wagon ways with in Northumberland thirty years ago. Anyhow, she steamed splendidly, and started the train as easy as any other no-ncompound locomotive. Mr. Busse determined to put thirty tons more on next day, and she walked away with them in first-class style, over the same ground as the previous day; after which the engine was put into regular duty, and has been running regularly since, and with the exception of a broken connecting rod on the high-pressure engine, and a broken piston head in the low-pressure cylinder—both of which showed flaws in the iron—nothing has been done to her.

This engine can be seen at work any day on the West Division in Jutland. I nearly forgot to state that on both breakdowns she worked her train to the depot, the one time with the high pressure cylinder alone, and the other with the low-pressure cylinder worked with the steam direct from the boiler. I for one feel satisfied that the compound is the locomotive of the future, whatever drawbacks there may be at present.

Government Contracts for Steel.

Mr. Whitney, Secretary of the Navy, opened bids on March 22, for steel gun forgings and armor plates. Proposals were offered by the Cambria Iron Co., Johnston, Pa., by the Midvale Steel Co., of Philadelphia, by the Bethlehem Iron Co., of Pennsylvania; and by the Cleveland Rolling Mill Co. The invitations were for "about 1,310 tons of steel gun forgings" and "about 4,500 tons of steel armor plates and appurtenances." As scheduled the bids were as follows:

Name of Company.	Armor plate.	Gun steel.
Cambria Iron Co.	.....	$851 513.90
Midvale Steel Co.	.....	1,:97.240 00
Bethlehem Iron Co	$3,610.737 50	902,230.79
Cleveland Rolling Mill Co	4,021,560.00	.....

The awards will be announced in about 15 days. It is probable that the Bethlehem Iron Co. will receive the contract. It is the only company proposing for both the armor plate and gun steel.

Car Heating and Lighting.

The Fitchburg company is equipping two of its locomotives and 8 passenger cars with the Sewell system of heating. Electric lights are being put into the same train.

English Railroads.

Fifteen leading roads of Great Britain report gross earnings for 1886 amounting to £25,202,618. The per cent. of operating expenses was 48.6. The gross receipts of the 22 principal railways in Great Britain and Ireland show an increase for this year up to the 6th inst. of 1.54 per cent., as compared with the receipts for the corresponding period of 1886. The mileage has increased 0.8 per cent. The increase of receipts for the week ending March 8 was 8.6 per cent., the passenger and parcel traffic increasing 15.4 per cent. and the freight traffic 6.5 per cent. These figures indicate that revival of trade in England which almost follows an increased activity in business here.

Life of Ties.

Certain experiments made at the suggestion of Professor Sargent by the Boston & Providence Railroad have an important bearing on the life of ties. Fifty-two ties were laid in December, 1878, on a track in Boston where the traffic is very heavy, having an average of 65 trains daily. Ten kinds of wood were tried, 5 in the natural state and 5 creosoted. None of the ties have rotted, except one of the ailantus; the others that had to be removed had been injured by the hammering of the trains. Spruce, hemlock, larch and southern pine have all suffered badly in this way. White oak lasted well, but it holds the spikes so firmly that they cannot be drawn when the rails have to be shifted. Creosoted elm and birch did well, and are to be recommended. Chestnut was unfortunately not included in the experiment, although it is considered one of the best woods for ties. The behavior of the catalpa was one of the most interesting features of the case; it has been highly spoken of for ties on account of its practical indestructibility when placed in the soil, and all the ties of this wood here tried are still sound, except just under the rails, where they are crushed nearly to pulp, so as to be of no service whatever for roads of heavy traffic.

Consumption of Pig Iron in 1886.

	Tons.
The stocks of iron in the United Kingdom at the end of 1885 were	2,352,162
The total production of pig in 1886 was	6,870 665
Total	9,222,834
Deduct stocks at Dec. 31, 1886	2,491,506
Which shows the consumption in 1886 to have been	6,731,328
Against a consumption in 1885 of	6,707,955
Increase of consumption in 1886	23,373

The total quantity of pig iron in stock in the United Kingdom at the end of 1886 was equal to 37 per cent., or 19.4 weeks consumption of the total quantity or pig iron that was disposed of in that year. As compared with previous years this is an unsatisfactory state of affairs, the figures for each of the four years ended 1885 having been as under:

At Dec. 31, 1882, the stocks were equal to 18.2 per cent., or 9.4 weeks of that year's consumption.

At Dec. 31, 1883, the stocks were equal to 21.1 per cent., or 10.4 weeks of that year's consumption.

At Dec. 31, 1884, the stocks were equal to 24.5 per cent., or 12.7 weeks of that year's consumption.

At Dec. 31, 1885, the stocks were equal to 35 per cent., or 18 week's of that year's consumption.

The consumption of pig iron in the United Kingdom in 1886, although 23,373 tons more than that of the previous year, was 652,159 tons less than that of 1884, and 1,717,040 tons below that of 1883.—*Iron Trade Exchange.*

The Martin System of Heating Cars.

This system was tested on the New York Central on the 17th inst. on a train running between New York and Poughkeepsie. The train was composed of five cars, one baggage, one smoker and three passenger coaches. On the down trip the device worked satisfactorily. Before the train left for Poughkeepsie the engine was attached to the cars for 50 minutes and steam sent through the pipes. The cars were comfortably warmed and the temperature was easily controlled. No trouble was experienced with the pipes, but there was a slight leakage from two or three of the joints upon the couplings.

Compound English Freight Locomotive.

Compound locomotives have been chiefly used for passenger service, but for several months past a compound engine has been hauling freight trains on the Northwestern Railway (England), and her performance has given such satisfaction that ten more engines of this class are now being built. The system of compounding adopted is that known as the Worsdell & Von Borries, and the engine in question is designed by Mr. T. W. Worsdell, the Locomotive Superintendent of the Northeastern.

The engine resembles exactly in appearance an ordinary English freight or goods engine, with six coupled wheels and inside cylinders, and indeed the axles, high-pressure valve gear and high and low-pressure slide bars, cross-heads, connecting and coupling rods are interchangeable with those of ordinary engines of this class. Even the centres of the cylinders are the same distance apart.

The high-pressure cylinder is 18 in. diameter and 24 in. stroke, while the low-pressure cylinder has the same stroke and 26 in. diameter. The other leading dimensions are as follows:

	High pressure. In.	Low pressure. In.
Length of ports	11¾	17
Width of steam port	1¾	2
" " exhaust "	3½	3¾
Lap of slide valve	1⅛	⅛
Maximum travel	5¼	5½
Lead	⅛	⅜
Inside clearance		⅛
Diameter of drivers on tread, new		61¼ in.
Heating surface:		
Tubes	1,026	sq. ft.
Fire-box	110	" "
Total	1,136	sq. ft.
Grate area	17.2	" "
Weight in working order (all on drivers)	93,700	lbs.

The London *Engineer* states that this engine hauls an average train, being forty loaded wagons, but it has frequently taken fifty in the regular time allowed. The engine works freely, maintains steam fully and is well master of its loads, starting from any point easily and with as great facility as any ordinary engine. The amount of coal used for one month averages 6 lbs. per mile less than all the engines on the same work, and when the train weight is the same average. This represents just 15 per cent. of gain in fuel alone. A special two days' measured trial for the consumption of this engine, as compared with the best ordinary engine on the same service, resulted in the compound engine hauling 16 per cent. more cars with a consumption of 18 per cent. less fuel, the same proportion of loaded and unloaded cars being taken. The weather was the same for each.

A saving of from 15 to 18 per cent. of fuel is realized in compound engines on this principle. It is found that each main line goods engine in steam consumes annually about 800 tons of coal. If 15 per cent. of this is saved it amounts to, say, 120 tons per annum; an item of importance on any line, even where coal is cheap, but much more where the coal is high in price—as at $2.50 per ton the saving in coal alone would be $300 per engine per annum.

The cab is larger than usual, in order to give greater shelter and comfort to the men. The Northeastern main line running along the east coast is peculiarly exposed to heavy easterly gales. The sides are of iron, the roof of wood; the glass windows in the front and sides slide so as to open, and there is as ample a lookout as in any other engine.

The valve gear is Joy's. The wheels and motion plate, and all brackets, etc., are of cast steel; all the working parts have large surfaces, and everything has been arranged with a view to keep out of the repairing shops as long as possible. The working boiler pressure is 160 lbs. per square inch. This is the first compound freight or goods engine that has been used on an English line. In other countries there are several freight engines compounded on the same principle—Worsdell and Von Borries—having two cylinders only.

Henney's System of Heating Cars.

A test of the system of car heating, proposed by Mr. John Henney, Jr., Superintendent of Motive Power of the New York, New Haven & Hartford Railroad, was made on that road on Feb. 23, and very satisfactory results obtained. The exhaust from the Westinghouse Air Pump was delivered into the ordinary radiating pipes of the Baker system.

In order to ascertain how quickly four cars can be heated by the steam from a locomotive, orders had been given during the forenoon to extinguish whatever fire there might be in the stoves. Then the windows of the cars were raised, and the raw March wind had an unobstructed passage through the cars. When the locomotive was coupled to the engine, connection was established between the exhaust steam pipe on the side of the locomotive and the steam pipes that extended through the several cars, the old pipes in the cars being used for the experiment. Despite the frigid atmosphere in the cars at the commencement of the experiment, caused by these open doors and windows, in thirty minutes from the time the windows were closed and steam let on, the cars were as warm as stoves could possibly have made them. The train made the run to New Haven in fifty-five minutes, and the last car was kept as warm as the first. It required no more steam and, consequently, no more fuel, than was needed to run the engine, the steam used for heating having before been wasted. The pipes are so arranged that, in case of accident, the steam can be let out instantaneously from the outside of the car, thereby preventing any injury from scalding by steam.

Experiments will shortly be made on this road with a new system of lighting cars by electricity.

Brashears Sleeping Car.

A company was incorporated in Baltimore, Md., last week which intends to manufacture parlor and sleeping cars of a new invention. An exhibition of a model of the car was given in a parlor at the Carrollton Hotel in Baltimore. It is the invention of Mr. W. J. Brasbears, of Washington, a Marylander and practical car-builder. The sleeping berths, instead of being folded up and stowed as top hampering, are on slides that stow them in a compact form at one end of the car, out of the way entirely. The chairs or lounges can be folded out of the way on the floor, and are not used as part of the make up of the sleeping berths. The berths can be moved out on the slides by compartments, as required, leaving the balance of the car open, with the features of a parlor. The weight of the sleeping-berth paraphernalia, when moved away on the slides, rests on the car trucks, and does away with much of the cumbersome building peculiar to sleepers. The invention is to be given a practical trial in a full-sized sleeper that will be built for the new company.

Car Notes.

Two hundred coal cars of 50,000 lbs. capacity have just been built for the Chicago & Eastern Illinois. The principal dimensions of the cars are as follows:

Length	33	ft.	0	in.
Width	8	ft.	0	in.
Height of side boards	3	ft.	0	in.
Side sills	5	in. ×	14	in.
Top arch bar	3¼	in. ×	1¼	in.
Middle arch bar	3¼	in. ×	1⅛	in.
Bottom arch bar	3¼	in. ×	⅝	in.
Journals, length and diameter	7	in. ×	4	in.
Axle, diameter at centre			4¼	in.

Eight stakes, 4 in. × 5 in. at stake iron, are used a side.

The four truss rods are each 1 in. diameter. The top of the end sills are even with the top of the floor.

Curtains, instead of blinds, are being used on the passenger cars of the Chicago & Eastern Illinois.

Wells Automatic Block System.

Dr. Edward D. Wells, of Westminster, Md., has patented an automatic block system. The tracks are divided into sections, and a signal tower is provided. When a train is inside a block, the electric current sets the danger signal, and when another train approaches, an electric bell in its locomotive is rung as a warning. The ringing of this bell is produced by the contact of the locomotive with cogs in the middle of the track thrown together by the electric arrangement at the signal tower. When the block is cleared by the passing out of trains, the movement displaces the danger signal, the contacts in the tracks separate, and the approaching train passes into the block without any sound from its warning bell. The same system is applied to a switch. While the switch is open the contacts are thrown together in the middle of the tracks, and when the locomotive moves toward the switch its warning bell is rung. When the switch is closed the locomotive goes on without incident. The wire for this electric signal service can be strung on the usual telegraph poles, and the arrangement is claimed to be free from mechanical complexity.

Lighting Cars by Electricity.

The New York Central is experimenting in lighting cars by electricity. Besides the storage battery system now being tested on one of the parlor cars, a new system in which the lights are run from a primary battery is also to be given a trial as soon as possible. The storage method requires apparatus weighing a ton to be carried on the car, and there is a loss of 20 per cent. of power in charging. The weight of the primary battery apparatus is from 700 to 800 pounds, and it is claimed that it can be used for six months. Two lamps will be placed at each end of the car, and the platform will be made as bright as the interior of the coach.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Panama, annual meeting, at the office, New York, April 4.

Colorado Midland, annual meeting, at the office, Colorado Springs, Col., April 4.

Chicago & Alton, annual meeting, at the office, Chicago, April 4.

Joliet & Chicago, annual meeting at office of Chicago & Alton, Chicago, April 4.

Missouri Pacific, special meeting, at St. Louis, Mo., May 10.

Union Pacific, annual meeting, at Horticultural Hall, Boston, Mass., on March 30.

Dividends.

Dividends on the capital stocks of railroad companies hav been declared as follows:

Chicago, Rock Island & Pacific, $1.75 per share, payable May 2.

Connecticut River, 2 per cent. quarterly.

Lehigh Valley, 1 per cent. quarterly.

Long Island, 1 per cent. quarterly, payable May 2.

Oregon Railway & Navigation Co., 1½ per cent. quarterly.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *General Time Convention* will hold its spring meeting in New York City, on Wednesday, April 13.

The *Car Accountants' Association* will hold its annual convention in Atlanta, Ga., beginning on Tuesday, April 19.

The *Master Car-Builders' Club* holds its regular meetings at the rooms, No. 113 Liberty street, New York, on the third Thursday in each month.

The *New England Railroad Club* holds its regular meetings at its rooms in the Boston & Albany passenger station in Boston, on the second Wednesday of each month.

The *Western Railway Club* holds its regular meetings at its rooms in Chicago on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 15 Washington street, Chicago, at 7:30 p. m., on the first Tuesday of each month.

The *Association of North American Railroad Superintendents* will hold a meeting at the Hotel Brunswick, N. Y., on April 12.

The *International Car Accountants Association* will hold its annual convention at Atlanta, Ga., April 19.

Engineers' Club of Philadelphia.

This club met March 5, 1887. Mr. S. L. Kneass spoke of a new fixed nozzle automatic injector, that will restart itself, if from any cause its supply of water or steam be temporarily interrupted. It is especially designed for locomotive service where its power of adapting itself to varying steam pressures and its automatic action are especially desirable. Mr. R. W. Lesley presented illustrated notes on the manufacture of cement mortars in the United States.

Mr. T. J. Lewis sent a paper on the subject of the use of 3-inch or 4-inch steel tires, presenting the state of the discussion before the Western Railway Club.

Mr. A. P. Broomell sent an illustrated description of the large engines building to drive the centrifugal pumps for reclaiming the Potomac Flats at Washington.

American Society of Civil Engineers.

At the next meeting of the Society, Wednesday, April 6, the discussion of Mr. William Metcalf's paper on "Steel; its Properties and its Use in Structures and Heavy Guns," will be continued. At this time the subject has more than common interest, and a valuable discussion may be expected.

PERSONAL.

—D. L. Gallup has resigned the position of Auditor of the Atlantic & Pacific.

—F. I. Whitney has resigned the position of Assistant General Passenger Agent of the Michigan Central.

—C. H. Present, General Manager of the Oregon Railway & Navigation Co., has tendered his resignation to President Smith.

—O. H. Dorrance, Superintendent of the Nebraska Division of the Union Pacific, has resigned on account of ill health.

—James McIntire died at Wilkinsburg, Pa., this week, aged 81 years. He was once a foreman on the old Portage road, and in later years was Trackmaster on the Pennsylvania.

—Mr. C. L. Redfield has recently become Managing Editor of *Wood and Iron*, a Minneapolis (Minn.) monthly journal devoted to the interests of manufacturers, mechanics and engineers.

—D. Jones Lucas has resigned the position of engineer of the East Penn Oil & Gas Co., and will go to Springfield, Ill., as engineer in charge of construction for the St. Louis & Chicago Railroad Co.

—W. C. Rinearson, General Northern Passenger Agent of the New York, Lake Erie & Western, was presented on his 38th birthday last week with a gold watch, chain and charm by the members of his staff.

—Edward C. Reddington, one of the leading financiers of Vermont, died at Bradford, Vt., on March 21, aged 76. Mr. Reddington was Treasurer of the Portland & Ogdensburg railroad from the opening of the line until 1874.

—Mr. T. W. Worsdell has not been appointed Chief Locomotive Superintendent of the London & Northwestern (England) as erroneously announced by the London *Railway News* and thence copied in our columns last week.

—Michael Rickard, who has been nominated for Railroad Commissioner of New York State by Governor Hill, is a native of Herkimer County, 50 years of age, and was the candidate of the New York Brotherhood of Locomotive Engineers for the position.

—Robert Garrett, President of the Baltimore & Ohio, has given a present of $8,000 to Princeton College for its new Art School building. Mr. Garrett is a graduate of Princeton, class of '67. He has accepted the invitation from Dr. McCost, the President, to lecture before the students on "Railroading."

—Horace Wilbur died of pneumonia at his home in Boston on March 23. Mr. Wilbur had been Auditor of the Union Pacific Railroad Co., Treasurer of the Central Vermont & National Transportation Co. He had also held the latter position with the Vermont & Canada and with Little Rock & Fort Smith Railroad companies.

—Henry S. Ives, a very young man, succeeded to the vacancy in this week's newspapers left by Alfred Sully, resigned. Mr. Ives was the *ignus fatuus* of the reporters in their wild-eyed hunt for a "beat" on their contemporaries. He is scarcely 30 years of age, and looks much younger. His residence is in Brooklyn, and his mode of living is expensive and gorgeous to a high degree. If Mr. Ives has gained control of the Baltimore & Ohio road he is making very little noise about it.

—On March 22 President Cleveland appointed five Interstate Commerce Commissioners. They were Thomas M. Cooley, William R. Morrison, Augustus Schoonmaker, Aldace F. Walker and Walter L. Bragg. The first-named gentleman, Thomas M. Cooley, was born in Attica, N. Y., in 1824. He received a fair academic education, and in 1842 began the study of law. In 1843 he removed to Adrian, Mich., where he continued his law studies, and was admitted to the bar in 1846. He constantly gained prestige in his profession and established himself as an

able practitioner. In 1857 he was chosen by the Michigan Legislature to compile the laws of the state. This work was very successfully done. In the following year he was chosen reporter of the Supreme Court, holding the office until 1864, when he was elected Justice of the Supreme Court, a place which he held for 21 years. At the same time he filled a law professorship in the University of Alabama and also found time to write his work, entitled, "Constitutional Limitation of Legislative Powers in the State." He is author of several legal works, the best of which is on constitutional limitation. He is now Receiver of the Wabash system east of the Mississippi. In politics he is a Republican.

William R. Morrison is a native of Illinois, and is 62 years of age. He was educated in the common schools of his native state, became a lawyer, and was subsequently Clerk of the Circuit Court. He was afterward a member of the Illinois Legislature, serving 5 years. He was then elected a member of the Thirty-eighth Congress, but served only one term. He was returned again to the Forty-third Congress, since which time he has been a member of that body.

Augustus Schoonmaker was born in Ulster County, N. Y., and is 59 years of age. He is a lawyer by profession. In 1863 he was elected County Judge, in 1875 a member of the State Senate, and in 1877 Attorney General of New York State. In 1883 he was appointed by Gov. Cleveland a member of the State Civil Service Commission, an office which he still holds.

Aldace F. Walker is a resident of Rutland, Vt., and a lawyer by profession. For many years he was a partner of Judge John Prout. The firm was counsel for the Delaware & Hudson Canal, the Rutland and the Vermont & Canada railroads. During the war he was Lieutenant-Colonel of one the Vermont regiments and was wounded. He is 47 years of age.

Walter L. Bragg was born in Alabama in 1838, but resided in Arkansas from 1843 to 1861. He was educated at the Harvard University and the Cambridge Law School. At the close of the war he settled in Alabama, and was for some years the law partner of General Morgan. He has been a leading Democrat in that state for some years, and has served as Presidential Elector and member of the Democratic National Committee. In 1881 he was made President of the Alabama State Railroad Commission, and served in this place four years.

ELECTIONS AND APPOINTMENTS.

Bangor & Piscataquis.—The following directors were elected last week: E. B. Nealy, A. G. Wakefield, C. L. Marston, John Cassidy, I. Strickland, C. P. Stetson, B. B. Thatcher. The officers are: E. B. Nealy, President; Arthur Brown, Treasurer, H. W. Blood, Treasurer.

Brashears Parlor & Sleeping Car Co.—The incorporators of this Baltimore company are: T. D. Singleton, President; George J. Johnson, Vice-President; Shipley Brashears, Secretary; Geo. J. Bessler, Treasurer; Samuel W. Regester, M. H. Plunkett, Nicholas Tegges, J. J. Hellman, Col. W. H. Crock, E. G. Davis, John Scott and Fillmore Beall.

Chatham & Harwich.—The following officers were elected last week at a meeting in Harwich, Mass.: Hon. Marcellus Eldredge, Mayor of Portsmouth, N. H., President; Charles Bassett, Chairman of the Board of Selectmen of Chatham, Clerk and Treasurer; Hon. Marcellus Eldredge, of Portsmouth; Osborn Nickerson, Alvin Z. Atkins, Collin Howes and Charles Bassett, of Chatham, directors.

Chattanooga Land, Coal & Iron Co.—Of this new Tennessee company, J. W. Adams, of Chatanooga, is President; T. C. Montague is Vice-President; H. Clay Evans, Secretary.

Chicago, Danville & St. Louis.—The incorporators of this Illinois company are H. W. Beckwith, Danville, Ill.; H. T. Caraway, Tuscola, Ill.; O. S. Lyman, John R. Patterson and Henry A. Rubidge, of Chicago.

Cleveland, Akron & Columbus.—At the annual meeting in Cleveland, O., the following were elected directors: John A. Horsey and Ex Norton, of New York; and N. Monsarrat, C. W. Schaap, of Akron; J. M. Adams, L. A. Russell and G. D. Walker, of Cleveland. Mr. Monsarrat was elected President and General Manager; Mr. Horsey, Vice-President; Mr. Schaap, Auditor and Treasurer; and Mr. Walker, Secretary.

Cumberland Plateau, Obed River & Nashville.—The incorporators of this Tennessee company are L. T. Smith, John C. Wright, S. V. Bowden, W. J. Smith, T. B. Conatser, and W. H. Goodpasture.

Elgin, Joliet & Eastern.—The incorporators of this Illinois company are J. W. Howell, of Evanston, Ill.; Russell Whitman, Edward Deming, Wm. J. Malden and George M. Trowbridge, of Chicago.

Fitchburg.—Daniel Gleason has been elected Treasurer, in place of M. D. Benson, resigned.

Florida Railway & Navigation Co.—At a meeting in Fernandina, Fla., last week, the old board of directors was unanimously re-elected.

Griffin, La Grange & Birmingham.—The officers of this new Georgia company are: Douglass Green, of New York, President; W. H. Seary, of Georgia, Vice-President.

Hastings, St. Paul & Cannon Falls.—The following have been elected officers: President, R. C. Libbey; Vice-President, J. C. Meloy; Secretary, G. W. Noesen; Treasurer, George Barbaras.

Housatonic.—William H. Stevenson has been elected Vice-President. W. E. Downs, of Derby, Conn., is elected a Director in place of Henry J. Leavitt, resigned.

Inter-state Commerce Commission.—President Cleveland has appointed the following board of Inter-state Commerce Commissioners: Thomas M. Cooley, of Michigan, for the term of six years; William R. Morrison, of Illinois, for the term of five years; Augustus Schoonmaker, of New York, for the term of four years; Aldace F. Walker, of Vermont, for the term of 3 years; Walter L. Bragg, of Alabama, for the term of 2 years.

Manhattan.—Col. F. K. Hain has appomted W. W. Thompson Foreman of Engines on the Western Division of the elevated road in New York.

Michigan Central.—W. R. Busenbark has been appointed Assistant General Passenger Agent, and George E. King, Assistant General Ticket Agent.

Missouri, Tennessee & Georgia.—The officers of this new Tennessee company are L. B. Wright, President; E. F. Plumsall, Vice-President, and C. H. Ferrell, Treasurer. Mr. Ferrell's address is Humboldt, Tenn.

New York Railroad Commission.—Gov. Hill has nominated Michael J. Rickard, of Utica, for Commissioner in place of John O'Donnell.

Pennsylvania.—At the annual election for directors in Philadelphia on March 22, the old board was elected without opposition. Total number of shares voted on, 647,212. The board is as follows: George B. Roberts, Wistar Morris, Alexander M. Fox, Alexander Biddle, N. Parker Shortridge, D. B. Cummings, Henry D. Wash, John Price Wetherill, William L. Elkins, William Thaw, H. H. Houston, A. J. Cassatt and C. A. Griscom.

Philadelphia & Reading.—W. G. Yetter has been appointed Superintendent of the Catawissa Division, including the portion of the Catawissa & Williamsport Branch from East Mahanoy Junction, Pa., to West Milton and the Milton and Treseckow Branches; office at Catawissa. A. A. Hesser, Superintendent of the Mahanoy Division will also have charge of the Catawissa & Williamsport Branch from West Milton to Newberry Junction.

Pittsburgh, Cincinnati & St. Louis.—At the annual meeting held in Columbus, O., the following directors were elected: G. B. Roberts, Henry H. Houston, Wistar Morris, J. N. Dunbarry, W. H. Barnes, John Price Wetherill, of Philadelphia; J. N. McCullough, William Thaw, Thomas D. Messler, of Pittsburgh, Pa.; David S. Gray, of Columbus, O.; and Robert Sherrard, Jr., and George W. McCook, of Steubenville, Ohio.

St. Johnsbury & Lake Champlain.—The following appointments have been made by President Mellen: W. A. Stowell, Secretary and Treasurer; C. E. A. Bartlett, Cashier; H. N. Turner, General Freight Agent; Geo. W. Storer, General Passenger Agent; B. F. Kendrick, Auditor.

St. Louis, Vandalia & Terre Haute.—C. D. Hoiles has been elected Secretary, vice Williamson Plant, deceased.

South Chicago & Southern.—J. H. Young has been appointed Freight Agent.

Virginia, Parkersburg & Ohio River.—The incorporators of the West Virginia company are Albert E. Bruce, Gideon Migs, Perry G. Marshall, Rufus A. Cassel and Frank N Wedge, Zanesville, Ohio.

Wisconsin Central.—B. E. Hand has been appointed Assistant General Freight Agent, succeeding H. C. Barlow, who is promoted to the position of General Freight Agent.

OLD AND NEW ROADS.

Arlington.—Articles of incorporation filed in New York. It is a branch of the Newark & Hudson, which is itself a branch of the New York, Lake Erie & Western, and connects the former road with the New York & Greenwood.

Atchison, Topeka & Santa Fe.—Two decisions were given in Topeka, Kan., last week in the case of Venner against above company. One denied Venner's prayer to restrain the construction of the line from Kansas City, Mo., to Chicago, and also that known as the Indian Territory and Texas extension. The other denied an injunction to prevent the guaranty by the Santa Fe Company of the bonds of the Atlantic & Pacific Railroad Co.

This company is negotiating for the San Joaquin ranch at Santa Ana, Cal. The price asked is $1,250,000. The ranch covers 400,000 acres. The Southern Pacific Company tried to purchase it about a month ago, but failed.

Atlanta & Alabama.—The management of this road, which was chartered in Georgia last December, announces that the engineers are about to start into the field, and the plans are that construction work will begin by June. Road s from Atlanta, Ga., to Selma, Ala,, making the distance 175 miles, 50 miles shorter than the present rail route.

Atlanta & Hawkinsville.—The requsite amount for building this road ($250,000) has been subscribed, a stock company having been formed at Atlanta, Ga., which will undertake the completion of the road. The line starts at Atlanta and runs through Fayetteville to Senoia, then southeasterly to Hawkinsville, then to Thomasville and onward to Florida, having as its Southern terminus either Tallahassee, Madison or Monticello. It has not yet been determined which one of these towns will be selected. The entire length of the road will be 250 miles.

Baltimore & Ohio.—The company is arranging for a connecting line to Fairport, Ohio, by means of the Pittsburgh & Western and Pittsburgh, Painesville & Fairport roads. This gives a line from Lake Erie to Baltimore. The terminal facilities of the Pittsburgh, Painesville & Fairport are to be completed as quickly as possible. A large elevator will be erected at Fairport, work upon which is to begin at once. There will be 3 miles of docks along the lake front.

The differences with the Annapolis, Washington & Baltimore, recently reported in this paper, have been settled. Through trains are now running on the same schedule as that in effect previous to March 1.

Boston, Hoosac Tunnel & Western.—E. C. Benedict & Co., of New York, who own and represent more than one-sixth of the above property, deny the assertion made by Mr. B. F. Smith to the Boston Executive Business Association last week to the effect that this company favored the plans for the new road between Boston and Duluth, Minn. It is declared that the Boston, Hoosac Tunnel & Western Company is opposed to the whole business.

Boston & Maine.—It is stated that the lease of the Boston & Lowell road to this company has been authorized by the committees of directors of the Boston & Maine and Eastern companies. The proposition agreed to is, as heretofore stated, for a lease of the Boston & Lowell road for a term of 99 years on a basis of 7 per cent. guaranteed on the stock for 10 years and 8 per cent. thereafter. The agreement remains now to be ratified by the full boards of directors of the Boston & Maine, Eastern and Boston & Lowell roads, and subsequently by the stockholders of the several corporations. By the union proposed the Central Massachusetts road will become a part of the Boston & Maine system.

The bill authorizing the Boston & Maine to purchase the property of the Eastern Railroad Co., in Maine, has been passed by the Maine legislature.

Boston & Providence.—A bard pine bridge has been built temporarily in place of the one that fell at Forest Hills, Mass., last week. Regular trave has been resumed.

Brashear's Parlor & Sleeping Car Co.—Incorporated in Baltimore, Md., with a capital stock of $2,000,000, to build a new style of sleeping car, the description of which may be found in the Technical columns.

Burton Stock Car Co.—This company has arranged to have all its cars on the Fitchburg and on the New York, Chicago & St. Louis roads operated as line cars, and all mileage earned will be reported to C. S. Tappen, General Manager of the New York, Chicago & St. Louis.

Canadian Pacific.—The road in the Rocky Mountains is solidly blocked with snow and there is no likelihood of its being opened up for a week yet.

Cape Fear & Yadkin Valley.—Four miles of new track is reported on this road, which is now extended to within 2 miles of Walnut Cove, Hokes County, N. C.

Central, of Georgia.—Tate, Dunavant & DeBardeleben have the contract for the extension of the road from Goodwater to Leeds, Ala., about 50 miles. The work includes two tunnels, one of 1,200 ft. and the other of 2,400 ft.

Central Ontario.—The statement made in these columns last week to the effect that this company would build its line north from Wollaston, Ont., to Nipissing is officially confirmed. The new extension will be 150 miles long, from a station called Coe Hill, in Ontario, to North Bay; 125 miles of this road is through a pine forest. There are also many deposits of iron along the line, and it is to open up these resources that the road is built.

Charleston, Cincinnati & Chicago.—Col. J. E. McIntire of Buffalo, N. Y., is said to have secured the contract for the trestle work on this road between Camden, S. C., and Marion, N. C., 100 miles. Operations have begun.

Chattanooga Coal, Iron & Railway Co.—Organized at Chattanooga, Tenn. The company has purchased 25,000 acres of land in and around Chattanooga. The chief purpose of the company is to donate sites to manufacturers and take subscriptions in stock. The company is capitalized at $12,000,000.

Chicago, Burlington & Northern.—This company has made its first statement. It embraces the months of November and December, 1886. The road was opened between Chicago and St. Paul, Minn., on Nov. 1, 1886, and the Galena branch of 4½ miles was opened on Jan. 1, 1887. The statement is as follows:

	Nov.	Dec	Two months.
Earnings	$142,900	$149,295	$292,196
Expenses	95,640	108,925	204,566
Net earnings	$47,260	$40,370	$87,630

Chicago, Burlington & Quincy.—It is reported from Iowa that the company is preparing to shorten its line between Keokuk and Fort. Madison. A surveying corps is at work and a large quantity of steel rails have been delivered at Burlington, Ia.

Ground was broken last week preparatory to the construction of a large union station at Ottumwa, Ia., for which $100,000 has been subscribed.

Chicago, Danville & St. Louis.—This company has been incorporated to build a road from Danville, Ill., to St. Louis, Mo. Capital, $1,500,000.

Chicago & Eastern Illinois.—Construction work has begun on the extension from Sidell to Tuscola, Ill., 28 miles. A hundred men are now at work and the force will be increased to 300 next week.

Chicago & Grand Trunk.—Erastus Bush has been awarded a verdict of $20,486 in his suit to recover $40,000 for the work of grading 17 miles of the above road in 1882.

Chicago, Milwaukee & St. Paul.—In the annual report made public on March 19, it is stated that the company's Kansas City line is expected to be completed by August 1. The line from Sioux City, Ia., to Manilla is completed and operated for 37 miles, with 77 miles of track laid. The lines from Bristol, Dak., to Elrod, 34 miles, and from Roscoe north, 27 miles, are graded. The company has acquired one-fifth interest in the Belt Railway Co. of Missouri, and has contracted with that company for the use of its road as an entrance to Kansas City, Mo.

Chicago & Northwestern.—The general officers are investigating charges made by road employés against C. A. Swineford, Superintendent of the Madison Division; Assistant Superintendent R. A. Cowan and Chief Telegrapher W. A. Lawson. It is charged that the officials named have been guilty of tyranny in an effort to enforce total abstinence from drinking among employés of the road. The feeling on both sides is intense, and the trouble is attracting much attention.

The extension of this road is completed to Fort Fetterman, Wyo., and is being continued westward rapidly. It will enter Idaho near Eagle Rock, crossing Snake River and then running to Boisé City, Idaho. It is understood that connection will be made from Boisé City with the Oregon Pacific road.

The company is having built at Detroit, Mich., 500 20-ton ore cars for the Peninsula Division. These cars are of the latest improved pattern, eight-wheeled with automatic couplers.

Chicago & West Michigan.—It is reported that this company will extend its road to the Straits of Mackinaw from Pent Water, Mich. This is a distance in a straight line of 155 miles.

Cleveland, Akron & Columbus.—At the annual meeting of stockholders in Cleveland, O., arrangements were completed whereby the Dresden Branch is to be completed. An issue of $1,800,000 5 per cent. bonds was authorized. Of these only $1,300,000 will be issued at present, the remainder being held to provide the equipment of the new branch and for any other purposes to be determined hereafter. Of this issue, $700,000 will be used in the construction of the Dresden branch, which will extend from Killbuck, Holmes County, O., almost directly south through Coshocton County, to Dresden Junction, a distance of thirty-four miles; and there connect with the Muskingum Valley road for Zanesville. About 1½ miles of road is laid on the Dresden Branch and a construction force is now at work on the first ten miles. Contracts for the balance will be let early in April. There will be 21 bridges, the contracts for which will soon be made.

Columbus, Hocking Valley & Toledo.—Stevenson Burke and Charles Hickox, of Cleveland, O., ex-officials of the above company, have filed answer to the suit brought against them by John W. Shaw, the new president of the company, to compel them to account for $8,000,000 alleged to have been wrongfully removed from the assets of the company. They admit substantially that they bought up the stock of the three roads previous to the consolidation; admit that the seven shares in question never came in; admit the execution of a mortgage amounting to $14,500,000, and that they purchased the Hocking Coal & Railroad Company stock, being 15,000 shares of $100 each, for $8,000,000, which is the amount sued for. They claim to have done this with the consent and approval of the Board of Directors and stockholders, and that they are supported in this by the records of the Board of Directors, which authorize it to be done. They claim that for the $8,000,000 in question they gave to the railroad company the control of the stock of the Hocking Coal Company. They show that this was done officially, and published in a railroad manual so that the public could be informed, and no one deceived. After a long review of the case, they conclude that the complainant purchased four shares of the original Hocking Valley Company stock for the purpose of annoying and giving trouble.

Cumberland Plateau, Obed River & Nashville.—Incorporated in Tennessee. Proposed road leaves the Cincinnati Southern in Scott County, and runs westward to a point in the Cumberland River to Burtram's mill.

East Tennessee, Virginia & Georgia.—M. A. Maher has a large contract for building the culverts and abutments for the iron bridges between Rome and Macon, Ga.

Elgin, Joliet & Eastern.—Articles of incorporation filed in Illinois. It is proposed to construct a railroad from a

point near the southeast corner of Cook County, on the state line, through the counties of Cook, Will, Kendall, DuPage, Kane and Cook, to a point on the north line of Cook County, in the township of Barrington. The principal business office is to be at Chicago, and the capital stock is $3,000,000.

Evansville & Chicago.—The road has obtained right of way into the centre of the city of Evansville, Ind. The road will run to St. Francisville, Ill., where it will connect with road to Chicago, Indianapolis and Cincinnati.

Fargo, Grand Forks & Pembina.—Contractors may address A. C. Hurst, of Caledonia, Dak., for information in regard to the new road to be built from Fargo to Pembina, Dak., 150 miles.

Fitchburg.—The company is considering the project of building a road from Troy, N. Y., to a connection with the West Shore at South Schenectady. The line would cross the Delaware & Hudson below West Troy, and the New York Central & Hudson River half way between Albany & Schenectady. The road would be about 17 miles long.

Florida Railway & Navigation Co.—Suit has been brought at Jacksonville, Fla., against this company by the Mallory Steamship line, for unjust discrimination in freight in favor of the Clyde line of steamships, alleged to have been made by the railroad company.

Fort Smith & Southern.—Work will begin on this road in Arkansas, which is part of the Missouri Pacific system, within 60 days. It will start from Fort Smith, in Sebastian County, and run southward.

Fort Worth & Denver City.—This road is completed for 194 miles northwest from Fort Worth, Tex. The company asks to list $480,000 first mortgage 5 per cent. bonds at the rate of $16,000 per mile, and $1,000,000 of new stock at the rate of $20,000 per mile. The track is being laid very fast.

A contract has been let for the immediate building of a railroad to the top of Walders Ridge, a spot rich in mineral deposits. Cars are to be running in 4 months. Three bridges are to be built across the Tennessee River; 2 blast furnaces and 500 coke ovens will be immediately erected, and 4 other furnaces are being contracted for.

Georgia, Midland & Gulf.—The road, which is projected to run from Columbus to Athens, Ga., 160 miles, is now graded for 85 miles; the track is laid 43 miles northeast of Columbus, and regular trains are running over 34 miles. A large force is now at work completing the last 12 miles of the 1st division.

Griffin, La Grange & Birmingham.—Organized in Georgia to build a road from Griffin, Ga., where it will connect with the Covington & Macon road, to Birmingham, Ala., 150 miles.

Gulf, Colorado & Santa Fe.—It is reported that the road is to be extended from Paris, Tex., to St. Louis, Mo. The engineering corps is preparing to go into the field. The line will run northeast to Lanesport, Tex., thence to Dardanelle, Ark., and in a direct line to St. Louis.

It is stated that this company has bought the Texas Trunk, the Kansas & Gulf Short Line, and the Gulf & Pacific roads.

Hartford & Connecticut Western.—The extension from Rhinecliff, N. Y., to the Poughkeepsie bridge is now being surveyed, and construction work will begin when the frost leaves the ground.

Illinois Central.—Judge Blodgett, at Chicago, has refused to grant the injunction asked by the state of Illinois, restraining the company from filling in portions of the lake shore. The railroad company has already seized upon land valued at many million dollars.

A bridge is just completed on the Yazoo Branch over Shot Creek, near Yazoo City, Miss. It is a 140-ft. iron span, and the material was brought from Buffalo, N. Y. It cost $14,000.

Joliet, Aurora & Northern.—It is reported that this road, which was sold last week, was bought by the Joliet (Ill.) Steel Co.

Kentucky Union.—The company asks for a subscription to the proposed road of $200,000 from Fayette County, Ky., and $100,000 from Clark County.

Kings County Elevated.—The Court of Appeals, in Brooklyn, N. Y., has given a decision which reverses the decision of the Supreme Court and the General Term, and gives the above-named company the right to acquire property along Fulton street and build its line down that thoroughfare. Fulton is the principal business street of Brooklyn.

Kingston & Pembroke.—The stock of this Canadian road has been admitted to the regular list of the New York Stock Exchange. The road runs from Kingston, Ont., to Renfrew, 104 miles, connecting with the Canadian Pacific. The company is capitalized at $4,500,000, with a funded debt of $572,000.

Lake Erie & Western.—In the suit of the Central Trust Co., of New York, against this railroad company, Judge Gresham has overruled the exception of the plaintiff to the master's report relating to the claims of the Joliet Steel Co. The order sustains the exception of the Joliet Steel Co. to a disallowance of interest. The report relating to the principal of the claim and its apportionment is confirmed. Out of the proceeds of the sale of the Lafayette, Bloomington & Muncie Division and the Lake Erie & Western main line $58,163 principal and $7,039 interest are to be paid to the steel company. Of this total, $65,203, there is to be chargeable to the first road $43,534, and to the Lake Erie & Western, $18,966. The balance of the claim, $2,702, the courts fixed as an equitable charge on the Sandusky Division, and directed the steel company to apply to the United States Court of Northern Ohio for payment.

This company bought the Indianapolis, Pern & Chicago Road on March 21. The latter road was formerly a part of the Wabash, St. Louis & Pacific system. The price paid was about $3,500,000, or $20,000 per mile. The purchase gives the Lake Erie & Western an entrance into Indianapolis, Ind., and a line to the lakes.

General Manager Bradbury has been given authority to expend $100,000 on improving the road-bed.

Lehigh Coal & Navigation Co.—Messrs. Broadhead & Hickey, of Scranton, Pa., have received the contract for building the Wilkesbarre & Scranton branch. The price is thought to be about $400,000.

Little Miami.—This Ohio Company has the following rolling stock under construction: Two class I locomotives, one Class M locomotives, three Class E locomotives and five coaches. The I locomotive are for passenger service, and will cost $8,500 each. The M engine is a large eight-wheeler for shifting in the yards. The E engines are for freight runs, and cost $5,000 each. The coaches are of the latest improved style, provided with steam heaters.

Lookout Mountain.—The incline and narrow-guage line on Lookout Mountain, Tenn., was completed on March 19, and a large party made a trial trip. The incline runs from the base to the top at the point where General Hooker planted his flag after the battle above the clouds. The road is 1¼ miles in length. It cost to build nearly $200,000. It was planned by Major W. R. King, United States Engineer in charge at Willets Point, N. Y.

Louisville, Evansville & St. Louis and Louisville & Nashville.—Counsel for parties shipping railroad ties over these roads have filed complaints with the Railroad and Warehouse Commissioners alleging extortion on the part of the railroad companies. It seems that through bills of lading were given the shippers, but that local freight rates were charged from points of shipment to Mt. Vernon, Ill., over the Louisville, Evansville & St. Louis Railroad, and from the latter place to East St. Louis over the Louisville & Nashville.

Louisville & Nashville.—Contracts for the extension of the Birmingham Mineral branch of this road for 24 miles from Redding, Ala., have been let. Tracklaying to the Blue Creek level basin south of Birmingham is completed for 8 miles.

The company will build this year 134 miles of new railroad, of which 109 miles will be in Kentucky, distributed as follows: Pineville branch, 30 miles; extension to Springfield, 22 miles; Indiana, Alabama & Texas, 57 miles. Outside of that state it will build the Nashville & Florence road, 25 miles long.

Maine Central.—A fast express composed entirely of Pullman Palace cars will be put on for the summer travel between Boston and Bar Harbor, Me., via Lewiston. The company thinks of adopting the plan of tanks between the tracks from which the locomotive can scoop up water and thus obviate the necessity of stopping. The management also has under advisement the construction of a double track between Gardiner and Augusta, Me.

A new iron bridge will replace the wooden one over the Sebasticook River, at Pittsfield, Maine.

Memphis & Little Rock.—The trustees of this company, as reorganized, have offered to pay into the Arkansas treasury $30,000 of back taxes as an amicable settlement of the State's claim for taxes during the past 5 years.

Mexican National.—The branch to New Laredo, Mex., is being constructed. The new iron bridge over the Rio Grande at New Laredo will be used conjointly by the International & Great Northern and the Mexican National. The new station and offices near the bridge will soon be completed.

Under the plan of re-organization adopted by the stockholders last October, a new corporation has been organized and will issue $10,500,000 of 46 per cent. gold bolds, to be a first lien on the main line and branches of the old company, and also upon the lease of the Texas Mexican road and upon bonds and stock of the latter, and upon bonds of the Corpus Christi, San Diego & Rio Grande road.

Of the $10,500,000 bonds now offered, $2,000,000 have been accepted by the Mexican National Construction Company in payment of rolling stock and equipment. The unissued balance of $2,000,000 (or 3,000,000, if authorized) is to be held in reserve for possible future requirements.

Midland (Indiana).—Tracklaying began on this road west from Lebanon, Boone County, Ill., on March 18.

Minneapolis, Sault Ste. Marie & Atlantic.—Messrs. McMurtrie and Woodward, contractors on the Duluth, South Shore & Atlantic, have been awarded a contract on the first section of the above-named road, on the Sault Ste. Marie end.

Missouri Central.—The contract is let for the construction of this road, which is to run between St. Louis and Kansas City, Mo. Work will begin in April.

Missouri Pacific.—A contract has been given for the building of 10 miles of new road between Marshall and Napton, Mo., and work begins immediately.

Missouri, Tennessee & Georgia.—Incorporated in Tennessee. The proposed road is planned to start from Kansas City, Mo., and cross the Mississippi River at New Madrid, then crossing Tennessee into Alabama, running to Florence, in that state, and thence to Huntsville, Anniston and Atlanta. From the last city it is intended to go to Savannah, Ga.

Mount Pleasant & Big Rapids.—This company has been incorporated in Michigan. It is to be a connection of the Toledo, Ann Arbor & Northern.

New Haven & Derby.—At a meeting in New Haven, Conn., the stockholders passed a resolution advising the Common Council to sell the city's share of above road to any proper party other than the New York, New Haven & Hartford.

Newport News & Mississippi Valley.—There has been a bearing in the Connecticut Legislature on the repeal of this company's charter, which, it is charged, the company is violating. As evidence of this a circular issued by C. P. Huntington is cited, in which it is said that the company is issuing an amount of stock in excess of $1,000,000, which is the limit allowed by the charter. The company will propose an amendment at a later hearing.

New Roads.—The Boards of Trade of Durango, Col., and Albuquerque, New Mexico, are conferring for the purpose of building a road between their respective cities. Its construction is probable. It will be a narrow-guage, about 170 miles in length, and will probably be a part of the Denver & Rio Grande system.

Engineers are about to survey a road between Earlville, Madison County, N. Y., on the New York, Ontaria & Western road, and Canastota, on the West Shore road.

New York & New England.—The directors have granted the demands of the engineers and firemen for an increase of wages, amounting to about 25 per cent. in the wages of engineers and 10 per cent. in the wages of firemen.

New York, Pennsylvania & Ohio.—Nearly all the striking employés at Youngstown, O., have returned to their work.

New York & Southern Construction Co.—A bill has been introduced in the Virginia Legislature to incorporate this company, authorizing it to construct, improve and equip all structures proper to the use and operation of railroads in 12 Southern states.

Nittany Valley.—Incorporated in Pennsylvania. Proposed road is to be 7 miles long, extending from a point near Bellefonte, Pa., on the Bellefonte, Nittany & Lemont road, to a point near Zion, in Centre County. Capital stock, $75,000.

Norfolk & Western.—A bill has been passed by the Virginia Legislature authorizing this company to increase its capital stock to an amount to be decided upon by the directors. The present capital stock is $25,000,000—$18,000,000 preferred and $7,000,000 common. The object of the increase is to complete the branch lines in the mining districts of the state.

Northern Pacific.—The road in Dakota near Bismarck is flooded, and a few passengers have been transferred across the Missouri River in yawls. The water is from 10 to 30 ft. deep on the prairie, and there are 6 ft. of water in the railroad company's houses and machine shops at Mandan. Steamboats can pass over the prairie south of Bismarck, the water being 20 ft. deep. The railroad company has posted notices offering every assistance to emigrant passengers, and has offered free transportation to all passengers desiring to return to St. Paul or Duluth, Minn.

In the case of this company against Guilford Miller, Attorney-General Garland has rendered a decision. The question at issue was whether the officer of the Interior Department has authority to withhold lands within the indemnity limits from entry and settlement. Attorney-General finds that such withdrawal does not rest upon any statutory provision, but upon general authority of the Land Department, which has been recognized by Congress, repeatedly affirmed by the Supreme Court of the United States, and may now be regarded as too well established to be questioned.

The directors have ordered the construction of an extension of 60 miles of the Spokane & Palouse road, in Washington Ter.

Work continues constantly on the Cascade Division. The track force is at a new station called Martin, in Kittitas County, Wash. Ter. A bridge is to be built here. Engineer Huson says that the entire amount of snow sheds on this division will not exceed 18 miles.

Old Colony.—Charles F. Foster has received $20,715 damages from this company for injuries received at a South Boston crossing a year ago.

Omaha & Council Bluffs Railroad & Bridge Co.—Articles of incorporation have been filed at Omaha, Neb.

Philadelphia, Newtown & West Chester.—Construction work is to begin next month on this road, which is the extension of the Baltimore & Ohio to West Chester, Pa.

Philadelphia & Reading.—It is said that the company will dispense with the Bound Brook route, and get into New York over a new line now being surveyed. General Manager McLeod has said that the Philadelphia, Newtown & New York will be extended to a connection with the Central, of New Jersey, at a point that will give an air line from Philadelphia to New York one mile shorter than either of the present roads.

This company's canal boats have been blockaded in the Schuylkill Canal by the Schuylkill Navigation Co. This was done because the railroad company decided last week to abandon the canal in its coal traffic. The Navigation Company proposes to keep possession of all the boats in the canal, and their estimated value is $300,000.

The wages of employés in Philadelphia have been increased from 8 to 15 per cent. The coal and freight handlers were advanced 15 per cent. at the beginning of the year, a fact which has been kept quiet until now by both the employers and the employed.

Edwin Parsons, of Philadelphia, has filed an appeal from the foreclosure decree of the Philadelphia & Reading. He asserts that, as a holder of $100,000 of general mortgage bonds, he is injured by said decree, and desires to make an appeal therefrom to the Supreme Court of the United States. Justice Bradley of the latter court has granted the appeal.

Pittsburgh & Lake Erie.—The plan of reorganization of this company provides for the issue of $10,000,000 of first mortgage bonds, $5,000,000 in preferred stock and $7,000,000 in common stock. The outstanding 6 per cent. bonds will receive dollar for dollar in new 4s, and 50 per cent. in addition in preferred stock. The present stock will be exchanged for new stock on the payment of 4 per cent., for which preferred stock will be given. Foreclosure of the road is not contemplated. A syndicate is formed, by which the non-assenting securities will be bought in and $1,700,000 new 4s and $225,000 preferred stock be taken for $1,564,000 in cash. Assenting security holders may subscribe for these bonds, however, if they wish.

Pittsburgh & Western.—The road is to be connected with the Pittsburgh, Painesville & Fairport at Fairport, O. The arrangement will open a new lake outlet from Pittsburgh, Pa., furnishing a direct route to that city for the shipment of ores. Work now progresses at Fairport, and connection will be finished in June.

Pontiac, Oxford & Port Austin.—Judge Gresham decided last week that S. B. Martindale, Receiver of the New York, New England & Western Investment Co., is justified in bringing his suit against the above-named railroad company. The Receiver filed a report that he had taken testimony showing that the officials of the investment company had diverted $400,000 of the trust funds of the company to build the railroad, and that he, therefore, filed the bill in chancery against the road. Judge Gresham decided that Messrs. Short and Watson, who had moved to have the suit dismissed, must in twenty days file a bond to pay all the costs already incurred and to be incurred in the cases in Illinois and Michigan.

Poughkeepsie & Southeastern.—Work will begin on this new road as soon as the condition of the ground will permit. The road connects with the New York & New England at Hopewell Junction, Dutchess County, N. Y.

Richmond & Allegheny.—At a meeting held last week a modified plan of reorganization was adopted. The plan contemplates a small additional assessment on the old stock. It is proposed to pay off the Receiver's certificates and pay 2 per cent. interest in 1888 upon the new bonds, and 5 per cent. thereafter. The plan heretofore was to defer all interest until 1889. Provision is also made for the payment of car trusts as they mature. There will remain in the treasury $1,000,000 bonds for betterments of the property as business develops.

A bill has been introduced in the Virginia Legislature authorizing the company to increase its capital stock $6,000,000.

Richmond & West Point Terminal.—Alfred Sully, as President, has made his first report. It covers the period since the change of administration last November. It reviews the purchase of a controlling interest in the Richmond & Danville in November and in the first preferred stock of the East Tennessee, Virginia & Georgia in the following month. Simultaneously with the latter purchase the directors decided to acquire the outstanding 24,999 shares of Richmond & Danville stock by offering in exchange four shares to one. About 18,000 shares have been converted under this plan and the Terminal Company now lacks only about 7,000 shares of being the absolute owner of the Danville system. The report states that at the date of the change of management the new officers found the company in debt $3,161,325, of which $1,708,700 matured on Jan. 1. A temporary loan of $1,500,000 was negotiated, but upon the acquisition of the East Tennessee property, which required a cash payment of

$4,400,000, it was decided to fund this payment with the temporary loan and the existing indebtedness into a ten-year trust loan for $8,500.000. Stock and bonds to the amount of $21,416,000 were deposited with the Central Trust Company to secure the loan. At the same time the stock of the company was increased from $16,000,000 to $40,000,000. The company now owns $45,076,804 bonds and stocks, of which $21,416,000 are in trust. The only absolute fixed charge, according to the report, is $510,000 a year, being six per cent interest on the $8,500,000 trust loan. The company controls 4,277 miles of railroad. The report concludes as follows:

"Until time and results shall have indorsed the wisdom of putting together the properties now under the control of your company, the stockholders may accept the policy of this company to be not to acquire any additional property, except where such acquisition will unquestionably result in strengthening the financial resources as well as the credit of the company, and then only after the fullest consideration and where the effect of such acquisition cannot but enhance the value of the stock of the terminal company.

The Virginia Legislature has passed a bill legalizing $40,000,000 of capital stock heretofore issued by the above company, and about which there had been question as to its legality.

St. Johns River, Lake Weir & Gulf.—It is stated that this line will run from Lake George on the St. Johns River in Putnam County, Fla., through Kerr City, Grahamville, Lake Weir and thence to Auclote in Hillsborough County on the Gulf. New York parties are interested in the enterprise. Right of way is now being obtained. Proposed road is about 120 miles long.

St. Joseph & St. Louis.—This road, which was a part of the Wabash, St. Louis & Pacific system, and which extends from North Lexington, Mo., to St. Joseph, Mo., 77 miles, was sold last week, but to what parties is not yet ascertained.

St. Louis, Arkansas & Texas.—This company now has over 400 miles of new road under construction or being surveyed. Of these branches the Sherman branch will be 110 miles long, the Fort Worth branch 110 miles, the Shreveport extension 70 miles, the Little Rock branch 44 miles, and the Malden and Grand Tower extension of the Arkansas & Missouri Division 70 miles; making the total increase of the mileage of the system this year 494 miles.

St. Paul, Minneapolis & Manitoba.—General Manager Allen Manvel is reported as saying that the company has let contracts for the building of 670 miles of road which will be finished on Nov. 23. As stated before in these columns, the line is from Minot, Dak., west to Great Falls, Mont., and from Great Falls to Helena, and the contractors are D. C. Shepard & Co., of St. Paul, Minn. Mr. Manvel says that more than 5,000 graders will be employed, that track is to be laid by a tracklaying machine, and that three crews of men will work 8 hours each every day, the night work being done by means of electric lights. In this way it is expected that 5 miles of track can be laid every 24 hours.

San Bernardino & Los Angeles.—The track is laid from San Bernardino, Cal., to Cucamonga, 17 miles.

Seattle, Lake Shore & Eastern.—Preparations are making for active work on this road in Washington Territory. Anderson & Larsen have a contract for 10 miles in addition to the 5 miles previously secured by them. They now have 150 men at work. It is expected that the road will be completed for 20 miles by July.

South Chicago & Southern.—The Pennsylvania Company gives notice that above road, which leaves the main line of the Pittsburgh, Fort Wayne & Chicago at Colehour Junction near South Chicago, is completed to Hegewish, Ill., 5¼ miles from South Chicago.

Southern Pacific Co.—The Oregon & California Railroad is to be transferred to the above named company.

Toledo & Indianapolis.—Suit has been brought by Thomas McGrath and others against the Toledo & Indianapolis Railroad Co., the Toledo, Columbus & Southern, the Union Trust Co., of New York, T. P. Brown and others. The suit is to set aside the foreclosure sale of the Toledo & Indianapolis road. T. P. Brown, the President, bought the road in 1884. It is charged that Brown bought up preferred stock, secured money from other defendants on stock issued to them, had the road sold and bought it himself at a low figure. The bill asks that the sale be set aside and a receiver be appointed.

Union Pacific.—Line will be built this spring from Anaconda to Phillipsburg, Montana, 25 miles.

Virginia, Parkersburg & Ohio River.—Incorporated in West Virginia. The proposed road begins at or near Parkersburg, W. Va., and runs to Marlin's Bottom, Pocahontas County, passing through the counties of Wood, Wirt, Calhoun, Gilmer, Braxton and Pocohontas and the Chesapeake & Ohio near Greenbrier Bridge. Principal office at Zanesville, O.

Virginia Railroad Commission.—The House of Delegates in Virginia have adopted a resolution that the Committee on Railroads investigate the management of the Railroad Commissioners' office, to ascertain whether or not partiality has been shown by the Commissioner to certain railroads, and if he has not unjustly pursued the Atlantic & Danville Co. Also to determine if the office has been of sufficient benefit to warrant its continuance as now managed.

Wabash, St. Louis & Pacific.—Receiver Cooley filed a report in the Court at Chicago last week showing the receipts and expenditures of the company from Jan. 1 to March 1. It shows receipts amounting to $887,781. The disbursements on account of agents were $160,184; for operating expenses, $253,797; for supplies and material, $5,772; for interest, $16,034; making a total of $435,788, and leaving a balance of $451,993.

The petition of the Eastern Division bondholders, demanding $1,500,000 of the earnings of the Eastern lines, has been dismissed. The Western lines can now be turned over to the Purchasing Committee.

Wisconsin Central.—Suit has been brought against Charles L. Colby, President of this company, and others, by the executors of the late George C. Campbell. It is charged that the value of an interest owned by the deceased in the Western States Construction Co. was bought by the defendants at a figure much lower than its value, the said defendants having induced the executor to sell the property by misrepresenting its real value. The suit involves $100,000.

It is reported that this company will build a line from Abbotsford, Wis., to Wausau, 50 miles. Right of way has been secured.

Wisconsin Midland.—The company is surveying a line from Milwaukee to Waukesha, Wis., 15 miles.

Wisconsin, Pittsville & Superior.—Geo. Hiles has been enjoined from selling the above named road and the Milwaukee, Dexterville & Northern. The injunction was granted at the request of the administrator of the Hubbard C. Atkins estate.

TRAFFIC AND EARNINGS.

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

	1887.	1886.	Inc. or Dec.	P. c
Month of February:				
California South..	$62,645	$57,807	I. $4,838	8.3
Georgia Pacific..	74,824	66.209	I. 8,615	11 5
Lou., Ev. & St. L.	112,150	47,055	I. 65.095	138.2
Nash. & Chat...	249.460	184,651	I. 64,809	35.1
Texas Pacific.....	466,800	492,630	D. 34,176	7.8
Total.....	$965,885	$788,352	I. $177,533	22.5
Month of January:				
Balt. & Potomac.	$107,127	$101,091	I. $6,036	5.9
Grand Rap. & I..	141.235	116,734	I. 24,501	20.9
N. Y. & New E..	298,771	266,934	I. 31,837	11.9
Oregon Imp. Co..	263,351	193,022	I. 70,329	36.4
Shenandoah Val..	57.288	42,583	I. 14,705	34.5
Union Pacific	1,737,323	1,389,610	I. 347,743	25.7
Southern Pac. Co. (total)	2,403,814	2,008,420	I. 395.394	19.6
Gal., Ha. & S. A.	221,392	199,347	I. 22,045	11.5
Louisia. & West	58,539	51,321	I. 7,218	14.0
Morgan's L. & T.	368,274	389,877	D. 21,603	5.5
N. Y., T. & M..	12,459	11,730	I. 729	6.2
Texas & N. O..	81,334	82,703	D. 1,169	1.4
(Total) Pacific System.....	1,691,610	1 273,442	I. 388,174	30.4
Total	$5,008,939	$4,118,394	I. $890,545	21.6
Year to Dec. 31:				
	1886.	1885.		
Eliz., Lex. & B. S..	$937,594	$706,489	I. $231,105	32.7
Net earnings...	327,641	272,794	I. 54,847	20.1
Louisa. & West..	644,689	627,316	I. 17,373	2.7
Net earnings...	329,217	340,376	D. 11.159	3.2
Missouri Pacific..	28,194,367	26,956,210	I. 1,238,157	4.5
Net earnings...	11,885,941	11,569,650	I. 316 291	2.6
New. N. & M. V..	6,746,903	5,638,859	I. 1,108,047	19.2
Net earnings..	2,211,978	1,765,131	I. 446,847	25.3
So. Pacific.....	31,797,884	30,578,277	I. 1,219,607	3.9
Net earnings....	13,283,2.7	15,227,632	D. 1,944.405	12 0
Total (gross)...	$68,321.437	$64,507,148	I. $3,814.289	5.9
Total (net).....	28,038,004	29,175,583	D. 1,137,579	3.8

Early reports of monthly earnings are usually estimated in part, and are subject to correction by later statements.

Northwestern Freight Association.

At a Chicago meeting it was decided to advance the rate on grain and its products to 18 cents per 100 pounds from Minneapolis to Chicago and Milwaukee, to go into effect March 27 and continue for 60 days from that date.

East-bound Shipments.

The Chicago shipments to seaboard points for the week ending March 19 are reported as follows:

	Tonnage.	P.c.
Baltimore & Ohio.....	9,869	17.5
Chicago & Grand Trunk	6,115	11.0
Chicago, St. Louis & Pittsburgh.....	6,477	11 5
Lake Shore & M. S...	7,174	12.7
Michigan Central.....	5.798	10 2
New York, C. & St. L.	5,070	8.9
Pittsburgh, F. W. & C	15,431	27 3
Cin., Ind., St. L. & C	489	0.9
Total for the week..... ...	56,513	100.0

Trunk Line Commission.

It has been decided that the Trunk Line Commission is to continue as an organization after the inter-state law goes into effect, with such changes as the law makes imperative.

Canal Improvement.

The Canal Union's bill, appropriating $550,000 for improving the canals, passed the Assembly of New York State on March 22.

Bituminous Coal Prices.

The Bituminous Coal Producers shipping to the Eastern seaboard have announced that prices have been arranged, subject to the railroad tolls, which will be named this week. The price of coal at Baltimore, Philadelphia and Norfolk is to be $2.60 free on board, except where the contracts are large, and then the price is to be $2.50 free on board. The price of coal at the mines is to be $1.25 per ton, and at New York the price will be $3.25 per ton free on board, and $3.50 alongside. The tolls are said to be $1.15 and $1.25 per ton to tidewater, regulated by the quantity of the shipments. Under the rule of making the price at the point of delivery, the purchaser of the coal assumes all risks of rise and fall in vessel rates. The association fixes a fine for all who cut the price, which it is said can be legally collected. Contracts will be made by the bituminous producers this week. There is no prospect of an announcement of anthracite tolls before April 1.

Cotton.

Cotton movement for the week ending March 18 is reported as below, in bales:

	1887.	1886.	Inc. or Dec.	P. c.
Interior markets:				
Receipts.....	37.155	30.212	I. 6,943	22.9
Shipments.....	73.203	59,226	I. 13,977	23.5
Stock.....	200,914	392,722	D. 191,808	48.8
Seaports:				
Receipts..	57.716	57,743	D. 27	...
Exports.....	137,739	62,170	I. 75.569	121.5
Stock.....	654,784	906,152	D. 251,368	27.7

The total movement from plantations for the crop year ending March 18 was 5,985,611 bales, against 5,926,180 last year, 5,357,088 in 1884-85, and 5,291,282 in 1883-84.

Coal.

Coal tonnages for the week ending March 19 are reported as follows:

	1887.	1886.	Inc. or Dec.	P.c.
Anthracite.....	667,973	585,247	I. 82,726	14.1
Bituminous.....	290,463	167,890	I. 122,573	73.0
Coke (March 12).....	93,058	62,047	I. 31,011	49.9

Cumberland coal shipments for the week ending March 19 were 71,273 tons; total for the year to that date, 619,071 tons, an increase of 249,438 tons, as compared with the corresponding period of last year.

The coal tonnage of the Pennsylvania road for the week ending March 12 is as follows:

	Coal	Coke	Total	1886.
Line of road.....	169,071	91,559	260.630	196 433
From other lines..	101.120	1,499	102,619	100,051
Total..... ..	270,191	93,058	363,249	296,484
Year to March 12..	2,512 689	876,876	3,389,565	2,854,956

Increase for the week, 66,765 tons, or 22.5 per cent.; increase for the year, 534,609 tons, or 18.7 per cent.

New Elevated Roads.

A commission appointed by the Mayor of New York has decided that more rapid transit railroads are necessary for the city, and new routes are now being considered.

February Earnings of Ninety-six Roads.

Elaborate tables of mileage and earnings for February, are given in *Bradstreet's*. The roads are grouped geographically. In the case of 70 roads comparisons are made for 4 years, 1884, 1885, 1886 and 1887. The figures given below show the results for February, 1887, as compared with 1886, on ninety-six roads:

Roads.		—February, 1887.— Earnings.	Mileage.	—February, 1886.— Earnings.	Mileage.
Granger...	16	$3,738.295	13,214	$3,618,816	11,796
Central Western..	32	2,806,693	7,703	2,541,091	7,568
Eastern.....	8	1,227 252	1,802	1 130.955	1,800
Trunk line.....	5	4,180.323	5,404	3.881,164	5,404
Southern	22	3,709,557	9,649	3,757,542	9.513
Southwestern ...	9	2,534.739	6.286	2 061.025	5,961
Far Western	4	1,201,009	4,831	1.196,009	4.678
Totals	96	$19,490,868	48,889	$17,816,602	46,720

In this case the gross earnings show an increase of 7.4 per cent. and mileage increases 4.7 per cent. The earnings in 1886 of $381 per mile increase in 1887 to $398 per mile, or a gain of 4.7 per cent. It is interesting to compare these percentages of difference with the corresponding figures taken from the January report, always bearing in mind that the roads included in the two months' figures are not entirely identical, and that to that extent the comparison is not altogether just. The following, however, exhibits the main points for comparison:

	Earnings per mile. 1887.	1886.	Per ct. 1887 comp'd with '86. Gross earn's.	Mile- age.	Earn. per mile.
January, 97 roads.....	$425	$359	+ 22.2	+ 3.2	+ 18.
February, 96 roads	398	381	+ 7.4	+ 4 7	+ 4.7

The Iron Production of 1886.

The ascertained and estimated production of pig-iron for the past two years is as below:

	1885.	1886.	Increase.	Dec
United Kingdom.....	7,250,658	6,870,685	.....	379,993
United States.....	4,044,526	5,684,543	1,640,117	.....
Germany.....	3.751.775	3,339,803	.....	411,972
France.....	1,628.941	1,526,446	.....	102,495
Belgium.....	712,876	697,110	.....	15,766
Sweden.....	760.000	750,000	.....	10,000
Russia	464.737	470.000*	5,263	.. ..
Spain	452,000	456,000*	4.000	.....
Austria..... ..	145,000	162.000*	17.000	.....
	19,210,513	19,956,567	1,666,380	920,226

*Estimated.

The net increase, it will be observed, is 746,000 tons. No statistics of the production of the above-mentioned countries are available till 1870. Before that time, of the joint production of this country and the United Kingdom for the five years ending 1850, we produced on an average 47.4 per cent.; for the five years ending 1861 we produced 16.2 per cent. England then had a production of about 3,000,000 tons more than we, which excess was increased to nearly 5,000,000 in 1876, when our proportion of joint production was 22.2 per cent. The following table shows the yield and relative yields for the years mentioned:

	Production of pig-iron in U. S. and Europe. Tons.	Percentage made in U. S.	Percentage made in United Kingdom.
1870.....	11,862.880	14 0	50.3
1875...	13,643.667	14.9	46.6
1876.....	13.525,244	13.1	49.2
1880.....	17,917,026	21.4	43 3
1882.....	21,017.039	21.9	40 4
1885	19.210.513	21.1	37.7
1886...	19,956,567	28.5	34.4

The increase of production in the 17 years has been 68.2 per cent. During that time our percentage has about doubled, and that of Europe, aside from England, has increased about 30 per cent., or from 36 to 47 per cent. This increased production at widely distributed centres, as shown above, must have had a considerable effect on the price of pig-iron.

ANNUAL REPORTS.

Chicago, Milwaukee & St. Paul.

This company owns a line of road from Chicago, Ill., to St. Paul, 421 miles, with other divisions and branches of 4,500 miles. In 1886 there were 14 new lines opened, aggregating 377 miles, making a total mileage of 5,298. The average number of miles operated was 4,977.

The statement is for the year ending Dec. 31:

	1886.	1885.	Inc. or Dec.	P. c.
Earnings.....	$24.718,403	$24,413,272	I. $305,131	1 1
Expenses.....	14,560,264	14,512,471	I. 47,793	0.3
Net earnings	$10,158,139	$9,900,801	I. $257,338	2.5
Gross earn. p. mile	4.967	5,021	D. 55	1.1
Net " "	2,041	2,036	I. 5	....
Exps per mile,...	58.9	59.4	D. 0.5	...

STATEMENT OF INCOME ACCOUNT.

Jan. 1, 1886, by balance.....		$7,049,109
To second dividend out of net earnings of 1885, viz.:		
On preferred stock.	$753.932	
On common stock.....	772,607	
		1,526,539
Balance.....		$5,522,570
Dec 31, by net earnings	$10,158,139	
By other income.....	144.654	
Total.....	$10,302,793	
Dec. 31, to interest on bonds in 1886	$6.241,093	
To first dividends out of net earnings, viz:		
On preferred stock..... ...	753,932	
On common stock.....	772,608	
	$7,767.631	
		2 535,162
Balance Dec. 31, 1886.....		$8,057,732

The increase in the net earnings, as seen in the statement above, was the result of an increased economy of operation, and is quite a creditable condition, inasmuch as the rate per ton mile was, last year, lower than ever known before on the road—$1.17, a reduction of 10 per cent. from the previous year. The common stock received 1 per cent. more dividend and there were $5,000,000 more of preferred stock, thus making the payments $659,037 greater. Passenger rates in Wisconsin, Iowa and Minnesota were reduced during the year from 4 to 3 cents per mile, and the company has been deprived by Lake Superior competition of a large part of the revenue formerly derived from the transportation of wheat from Dakota and Minnesota. Despite these drawbacks, the report shows slight increases in gross and net earnings.